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Version: Version of Record

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“CREATIVITY: PSYCHOLOGICAL AND  
EVOLUTIONARY PERSPECTIVES”

Volume 1

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Awarded the Degree of Doctor of Philosophy (PhD)

Discipline: Psychology

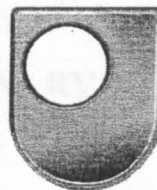
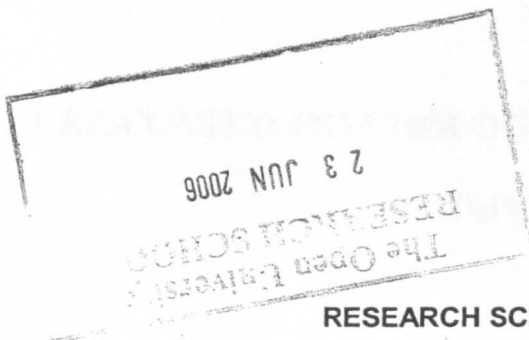
14<sup>th</sup> June 2006

AUTHOR NO: V0110883  
DATE OF SUBMISSION: 24 MARCH 2006  
DATE OF AWARD: 14 JUNE 2006

## **ACKNOWLEDGEMENTS**

I would like to dedicate my thesis to my son Nathan. Whilst doing this thesis he has grown from a baby into a young child and during this time I have learnt more from him than I could ever hope to learn in any academic institution. His joy for life is infectious and has got me through the tougher times over the past 3 years.

I would also like to thank my two supervisors; Professor Dorothy Miell and Dr Daniel Nettle. Their belief in me, their vast knowledge and experience, and the fact that they allowed me to express my creativity enabled me to gain the most out of this experience and to develop my love of research. My family and friends have also all been extremely supportive. In particular, my parents have provided considerable practical and emotional support for which I am very grateful.



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# **CREATIVITY: PSYCHOLOGICAL AND EVOLUTIONARY PERSPECTIVES**

## **ABSTRACT**

The most commonly cited explanation for the evolutionary emergence of creative ability is sexual selection. This suggests that the ability to produce creative products arose to advertise the qualities of the artist and thereby attract sexual partners. Thus the higher the quality of the product the greater the number of mates the artist will attract. The first study considered the definition of creativity by a general population and developed a measure of self-perceived creative ability. From the 344 participants it was found that creativity was predominantly considered to encompass Arts based activities. It was also considered by over 80% of the participants that creative products communicated something about the creative individual. The second study investigated whether artworks act as fitness indicators by accurately conveying the qualities of the artists. Six male artists each made an artwork and completed a personality inventory and an intelligence test. Fifty-one females rated the artists on creativity, intelligence and personality traits. Whilst intelligence was the only variable that was found to be significantly accurately assessed, qualitative analysis suggested that the raters were able to assess levels of personality traits but not to make subtle distinctions between these levels. Furthermore, these ratings were used in mate choice decisions when choosing which artist they would most like to go out on a date with. The final study was an online questionnaire asking artists about their artistic behaviours and attitudes, their and their partner's personality and their

reproductive success. Results demonstrated that more professional male artists gained greater numbers of sexual partners and used a more short-term mating strategy. Moreover, both male and female professional artists had significantly greater potential fertility than less professional artists. These results strongly support the sexual selection theory for the emergence of creativity.

# CONTENTS

<b>1. INTRODUCTION</b>	<b>1</b>
<b>2. WHAT IS CREATIVITY</b>	<b>5</b>
<b>2.1. EVERYDAY AND EMINENT CREATIVITY</b>	<b>5</b>
<b>2.2. ARTISTIC AND SCIENTIFIC CREATIVITY</b>	<b>8</b>
<b>2.3. IMPLICIT THEORIES OF CREATIVITY</b>	<b>9</b>
<b>2.4. APPROACHES TO CREATIVITY</b>	<b>12</b>
<b>2.4.1. The Environment</b>	<b>12</b>
2.4.1.1. Culture and Society	12
2.4.1.2. Other Social Influences on Creativity	15
2.4.1.3. Summary	16
<b>2.4.2. The Product</b>	<b>16</b>
2.4.2.1. Constituents of a Creative Product	17
2.4.2.2. Judges of Creative Products	18
2.4.2.3. Variations in the Quantity and Quality of Creative Products	20
2.4.2.4. Summary	22
<b>2.4.3. The Person</b>	<b>22</b>
2.4.3.1. Personality Traits	22
2.4.3.1.1. Openness and Creativity	22
2.4.3.1.2. Extraversion and Creativity	26
2.4.3.1.3. Conscientiousness and Creativity	29
2.4.3.1.4. Neuroticism and Creativity	31

2.4.3.1.5. Agreeableness and Creativity	32
2.4.3.1.6. Summary of Personality Traits and Creativity	33
2.4.3.2. Intelligence	35
2.4.3.2.1. Intelligence and Creativity	35
2.4.3.3. Motivation	39
2.4.3.4. Divergent Thinking	42
2.4.3.5. Summary	45
<b>2.4.4. The Creative Process</b>	<b>45</b>
2.4.4.1. Summary	47
<b>2.5. CONCLUSION</b>	<b>47</b>
<b>3. EVOLUTIONARY APPROACHES TO CREATIVITY</b>	<b>49</b>
<b>3.1. AN EVOLUTIONARY FRAMEWORK</b>	<b>49</b>
3.1.1. Universality	49
<b>3.2. EVOLUTIONARY MODELS FOR THE EMERGENCE AND MAINTENANCE OF CREATIVITY</b>	<b>51</b>
3.2.1. Creativity and Pretend Play	51
3.2.2. Cognitive Prerequisites of Creativity	53
3.2.3. Creativity and Survival	56
3.2.4. Aesthetics	57
3.2.5. Making Special	58
3.2.6. The Ancestress Hypothesis	62
3.2.7. The Evolution of the Artist	64
3.2.8. Summary	66
<b>3.3. SEXUAL SELECTION THEORY</b>	<b>67</b>

3.3.1. Processes of Mate Choice	68
3.3.2. Costs of the Handicap	72
3.3.2.1.Costs of Creative Production	73
3.3.3. Costs to Choosiness	78
3.3.4. Multiple Cues in Mate Choice	79
3.3.5. Heritability of Fitness and the Lek Paradox	83
3.3.6. Parental Investment and Mating Strategies	85
3.3.7. Mutual Mate Choice	90
3.4. CREATIVE PRODUCTS AS FITNESS INDICATORS	93
3.4.1. Indicators of Good Genes	93
3.4.2. The Qualities Expressed	96
3.4.3. Production through the Lifespan	99
3.4.4. Sexual Dimorphism	100
3.5. CONCLUSION	101
 4. DEFINITIONS OF CREATIVITY STUDY	 103
4.1. INTRODUCTION	103
4.2. METHOD	105
4.2.1. The Small-Scale Survey	107
4.2.2. Pilot Study	109
4.2.3. The Final Questionnaire	109
4.2.4. Presentation of the Questionnaire	113
4.3.THE SAMPLE	115

<b>5. DATA ANALYSIS OF DEFINITION OF CREATIVITY</b>	
<b>STUDY</b>	<b>117</b>
<b>5.1. DEMOGRAPHICS</b>	<b>117</b>
<b>5.2. DEFINING CREATIVITY</b>	<b>120</b>
<b>5.3. CREATIVE ACTIVITIES</b>	<b>122</b>
<b>5.4. THE CREATIVITY CONTINUUM</b>	<b>126</b>
<b>5.5. OPENNESS TO EXPERIENCE</b>	<b>130</b>
<b>5.5.1. Interests, Creativity and Openness</b>	<b>136</b>
<b>5.5.2. Age, Sex, Creativity and Openness</b>	<b>138</b>
<b>5.5.3. Summary</b>	<b>142</b>
<b>5.6. THE CREATIVE PRODUCT</b>	<b>142</b>
<b>5.7. JUDGES OF CREATIVE PRODUCTS</b>	<b>146</b>
<b>5.8. PERSONALITY TRAITS</b>	<b>151</b>
<b>5.9. DEFINING FACTORS OF CREATIVITY</b>	<b>158</b>
<b>5.10. CONCLUSION</b>	<b>162</b>
<b>6. THE FITNESS INDICATOR STUDY</b>	<b>165</b>
<b>6.1. INTRODUCTION</b>	<b>165</b>
<b>6.2. AIMS</b>	<b>167</b>
<b>6.3. THE “ARTISTS”</b>	<b>168</b>
<b>6.3.1. The Personality Test</b>	<b>170</b>
<b>6.3.2. The Artworks</b>	<b>173</b>
<b>6.3.3. Wechsler Abbreviated Scale of Intelligence (WASI)</b>	<b>174</b>
<b>6.4. THE PILOT STUDY</b>	<b>178</b>
<b>6.5. THE QUESTIONNAIRE</b>	<b>179</b>

6.5.1. Creativity of Artwork	179
6.5.2. Attractiveness of Artwork	179
6.5.3. Interestingness of Artwork	181
6.5.4. Communicative Ability of Artwork	182
6.5.5. Characteristics of the “Artists”	182
6.5.6. Demographic Questions	184
6.6. THE RATERS	186
 7. FITNESS INDICATOR STUDY DATA ANALYSIS	 187
7.1. THE MALE “ARTISTS”	187
7.1.1. Demographics	187
7.1.2. Creativity Continuum Scores	188
7.1.3. Intelligence Scores	190
7.1.4. Personality Scores	193
7.2. THE FEMALE RATERS	195
7.2.1. Demographics	195
7.2.2. Creativity Continuum Scores	196
7.2.3. Interests of Raters	198
7.3. RATINGS OF THE ARTWORKS	199
7.3.1. What is the Artwork Communicating	202
7.3.1.1. Artwork 1	204
7.3.1.2. Artwork 2	205
7.3.1.3. Artwork 3	206
7.3.1.4. Artwork 4	208
7.3.1.5. Artwork 5	209

7.3.1.6. Artwork 6	210
7.3.1.7. Summary	211
<b>7.3.2. Reflections of the “Artists” Through Their Artwork</b>	<b>212</b>
7.3.2.1. Rated Traits of the “Artists” and Ratings of the Artwork	212
7.3.2.2. Actual Traits of the “Artists” and Ratings of the Artwork	218
<b>7.4. CONSENSUS BETWEEN RATERS</b>	<b>220</b>
<b>7.4.1. Consensus for Variables over all Artworks</b>	<b>220</b>
<b>7.4.2. Consensus for Individual Artworks</b>	<b>229</b>
7.4.2.1. Attractiveness of Artwork	229
7.4.2.2. Interestingness of Artwork	230
7.4.2.3. Creativity of Artwork	231
7.4.2.4. Summary for Consensus among Ratings for Artwork	232
<b>7.4.3. Consensus for Individual Artworks on ratings of “Artist”</b>	<b>232</b>
7.4.3.1. Creativity of “Artist”	232
7.4.3.2. Intelligence of the “Artist”	233
7.4.3.3. Interestingness of “Artist”	234
7.4.3.4. Physical Attractiveness of “Artist”	235
7.4.3.5. Emotional Sensitivity of “Artist”	236
7.4.3.6. Physical Skill of the “Artist”	237
7.4.3.7. Outgoingness of “Artist”	238
7.4.3.8. Conscientiousness of “Artist”	239
7.4.3.9. Friendliness of “Artist”	239
7.4.3.10. Summary of Consensus Among Ratings for “Artists”	240
<b>7.5. ACCURACY OF RATERS SCORES</b>	<b>241</b>
<b>7.6. DATING PREFERENCE</b>	<b>250</b>



7.6.1. Summary of Dating Preferences	258
7.7. CONCLUSION	258
7.7.1. Limitations and Future Research	266
 8. PERSONALITY, SEXUAL BEHAVIOUR AND MATING SUCCESS. A LITERATURE REVIEW	268
8.1. INTRODUCTION	268
8.2. PERSONALITY AND SEXUAL BEHAVIOUR/ATTITUDES	268
8.2.1. Extraversion	268
8.2.2. Neuroticism	273
8.2.3. Agreeableness	275
8.2.4. Conscientiousness	276
8.2.5. Openness	278
8.2.6. Summary	281
8.3. PERSONALITY AND MATE PREFERENCE	283
8.3.1. Sex Differences and Similarities for Preferences in Personality	286
8.3.2. Mating Strategies and Preferences	289
8.3.3. Trade Offs in Mate Preferences	292
8.3.3.1. Summary of Trade Offs	294
8.3.4. Cross-Cultural Comparisons of Mate Preferences	295
8.3.5. Mate Preference Summary	296
8.4. CONCLUSION	296
 9. THE REPRODUCTIVE SUCCESS AND PERSONALITIES OF VISUAL ARTISTS	297

<b>9.1. INTRODUCTION</b>	<b>297</b>
<b>9.2. HYPOTHESES</b>	<b>298</b>
<b>9.3. THE QUESTIONNAIRE</b>	<b>303</b>
<b>9.4. THE SAMPLE</b>	<b>314</b>

<b>10. DATA ANALYSIS OF THE REPRODUCTIVE SUCCESS AND PERSONALITIES OF VISUAL ARTISTS QUESTIONNAIRE</b>	<b>316</b>
<b>10.1. DEMOGRAPHICS</b>	<b>316</b>
<b>10.2. DESCRIPTION OF ART</b>	<b>317</b>
<b>10.3. SELF-PERCEIVED ARTISTIC STATUS</b>	<b>318</b>
<b>10.4. FACTOR ANALYSIS OF ARTISTIC STATUS VARIABLES</b>	<b>319</b>
<b>10.5. FORMAL ARTISTIC TRAINING</b>	<b>321</b>
<b>10.6. MAIN OCCUPATION</b>	<b>325</b>
<b>10.7. INCOME FROM ART</b>	<b>327</b>
<b>10.8. NUMBERS, LENGTH AND SALES FROM EXHIBITIONS</b>	<b>332</b>
<b>10.8.1. Artistic Status and Exhibition Variables</b>	<b>335</b>
<b>10.8.2. Sex of Artist and Exhibition Variables</b>	<b>336</b>
<b>10.8.3. Public Display</b>	<b>337</b>
<b>10.9. TIME SPENT ON ART</b>	<b>342</b>
<b>10.10. TIME AS AN ARTIST</b>	<b>348</b>
<b>10.11. MENTAL ATTITUDES OF ARTISTS</b>	<b>349</b>
<b>10.12. SUMMARY OF ARTISTIC BEHAVIOURS AND BELIEFS</b>	<b>355</b>
<b>10.13. PERSONALITIES OF ARTISTS AND THEIR PARTNERS</b>	<b>356</b>
<b>10.13.1. Artists' Self-Ratings of Personality</b>	<b>357</b>

10.13.1.1. Sex Differences in the Artists' Personality Ratings	359
10.13.1.2. Self-Rated Status and the Personalities of Artists	360
10.13.1.3. Personality and Public Display	363
<b>10.13.2. Artists' Ratings of their Partners' Personalities</b>	<b>363</b>
10.13.2.1. Status of Artist and Partners' Personalities	364
<b>10.13.3. Artists' and their Partners' Personalities and Style of Artwork</b>	<b>365</b>
<b>10.13.4. Length of Current Relationship and Personality Variables</b>	<b>369</b>
<b>10.14. REPRODUCTIVE SUCCESS OF VISUAL ARTISTS</b>	<b>371</b>
10.14.1. Number of Biological Children (Achieved Fertility)	373
10.14.2. Number of Sexual Partners (Mating Success)	376
10.14.3. Mating Strategy	386
10.14.3.1. Personality and Mating Strategy	390
10.14.4. Frequency of Sexual Intercourse (Potential Fertility)	392
10.14.4.1. Personality and Frequency of Sexual Intercourse	397
10.14.5. Extra-Marital Affairs (Extra-Pair Copulations)	398
<b>10.15. CONCLUSION</b>	<b>399</b>
<b>11.CONCLUSION</b>	<b>405</b>
11.1. THE SEXUAL SELECTION HYPOTHESIS OF CREATIVITY	405
11.2. THE RELEVANCE TO THE PSYCHOLOGY OF CREATIVITY	409
11.3. FUTURE RESEARCH	411
<b>12.REFERENCES</b>	<b>416</b>

<b>13. APPENDIX 1. Creativity Survey</b>	<b>432</b>
<b>14. APPENDIX 2. Small Scale Survey</b>	<b>436</b>
<b>15. APPENDIX 3. Pilot Questionnaire</b>	<b>440</b>
<b>16. APPENDIX 4. Questionnaire</b>	<b>450</b>
<b>17. APPENDIX 5. Creative Behaviour Questionnaire</b>	<b>462</b>
<b>18. APPENDIX 6. “Artists” Recruitment Letter</b>	<b>464</b>
<b>19. APPENDIX 7. Personality Scale</b>	<b>466</b>
<b>20. APPENDIX 8. Artwork Instructions</b>	<b>475</b>
<b>21. APPENDIX 9. List of Craft Materials</b>	<b>476</b>
<b>22. APPENDIX 10. Fitness Indicator Questionnaire</b>	<b>478</b>
<b>23. APPENDIX 11. Consent Form</b>	<b>494</b>
<b>24. APPENDIX 12. Debrief Sheet</b>	<b>495</b>
<b>25. APPENDIX 13. Artworks</b>	<b>496</b>
<b>26. APPENDIX 14. What is the Artwork Communicating?</b>	<b>500</b>
<b>27. APPENDIX 15. Multiple Regression Analyses for “Artists’” Variables</b>	<b>518</b>
<b>28. APPENDIX 16. Histograms Demonstrating Degree of Consensus for Individual Artworks</b>	<b>527</b>
<b>29. APPENDIX 17. Reasons for Choosing the “Artist” to Go Out on a Date With</b>	<b>563</b>
<b>30. APPENDIX 18. Relationship between Date Choice and</b>	

<b>Ratings of “Artists”</b>	<b>567</b>
<b>31.APPENDIX 19. Medians and Ranges for Ratings of “Artists”</b>	<b>572</b>
<b>32.APPENDIX 20. Artists’ Personality and Relationships</b>	
<b>Questionnaire</b>	<b>577</b>
<b>33. APPENDIX 21. Advert for Recruitment of Artists</b>	<b>604</b>

# 1 INTRODUCTION

Creativity is one of the most defining and quintessential abilities of human beings. Increasing our knowledge of creativity therefore allows us to understand ourselves better. An exploration into evolutionary origins is fundamental to this understanding and may help to explain the functions and motivations behind our engagement in such behaviours.

This thesis considers the use of sexual selection theory to explain the emergence of creativity, and more specifically art, in humans since this appears to be the most commonly cited explanation for its evolution. Sexual selection is concerned with attracting and gaining sexual partners (mates), and the conception and survival of offspring with the ultimate aim of increasing one's reproductive success through the passing of one's genes into future generations. With respect to creativity, it is the creative product that is predicted to attract mates by acting as an indicator of the artist's qualities, and thereby fitness, with the emphasis on short-term sexual liaisons. Thus the main questions for this thesis are:

- Do creative products act as fitness indicators?
- Do highly creative individuals have greater reproductive success than less creative individuals?
- Are there sex differences in the reproductive success of artists?

Currently very few studies have been conducted in an attempt to support or refute the sexual selection hypothesis of creativity. Answering the questions

above will provide an insight into the evolution of creative behaviours based on empirical evidence rather than intuition and theory. This provides an exciting opportunity to gain new knowledge in a rapidly expanding field of psychology.

To address these issues the thesis consists of three separate but inter-related studies. Initially, two literature reviews are presented. In the first, the question of how creativity is defined in the psychological literature will be explored. Since the approaches to this question are commonly divided into ones that examine the environment, the creative product, the person and the creative process each of these areas is considered separately in an attempt to find some common ground within the literature.

The second literature review examines the evolutionary literature and its approach to explaining creativity. An in-depth review of sexual selection theory is then presented and predictions for any creative behaviour that has arisen through sexual selection are considered. However, before these can be tested a particular creative behaviour needs to be chosen on which this model can be tested. With this in mind and in an attempt to operationalize the term “creative” the first study used an online questionnaire and asked a general population sample about their definitions of creativity. This considered creativity from environment, product, person, and process perspectives as the psychological literature would suggest. Furthermore, although research often focuses on eminent creativity there is often an implicit assumption that creative ability lies on a continuum. This suggests the need for a measure that reflects a continuum

perspective and so an attempt will be made to construct such a scale in the first study.

The second study asked the question “do artworks act as fitness indicators?” This is explored, as it is one of the fundamental principles that would need to be supported if sexual selection is to apply to visual art. An examination of this has not previously been undertaken and so an original experiment was designed to identify whether participants were able to accurately assess the characteristics of an artist purely through a consideration of his/her art and, if so, how this information might be used in mate choice decisions.

To tackle the remaining aims of this thesis a third study on artists’ reproductive success and personalities was conducted. However, before this could be carried out a literature review on the influence of personality on sexual behaviour and mate preferences was required. This literature review provided an understanding of the evolutionary functions of personality traits and how personality may affect reproductive success. From this analysis followed the third and final study: an online questionnaire investigating whether more professional artists had greater mating success, numbers of biological children (achieved fertility), frequency of sexual intercourse (potential fertility) and whether or not sexual dimorphism was found (i.e. these relationships held for male but not female artists). It also considered the interactions between personality and reproductive success.



Finally, the conclusion considers the results of the studies presented in this thesis in relation to the sexual selection hypothesis of visual art and to the psychology of creativity more generally. To finish, it discusses future research opportunities.

## **CHAPTER 2.**

### **WHAT IS CREATIVITY?**

Feist (2001) believes that there exists a consensus on the core definition of creativity. That is that creativity involves bringing something into being that is novel and adaptive (Feist, 2001). However, a review of the literature on creativity quickly reveals that, although many creativity researchers would not disagree that these are important elements, there is no definitive consensus to the question what is creativity? In fact, by 1988, 60 different definitions were identified in the academic literature (Spiel, 1998). This, in part, reflects the complexity of the concept.

#### **2.1. EVERYDAY AND EMINENT CREATIVITY**

Within creativity research there is a distinction between “everyday” and “eminent” creativity. The predominant difference between the two is that eminent creativity, unlike everyday creativity, is socially recognised as creative (Richards & Kinney, 1990). This distinction implies that eminent creativity involves a product that can be assessed as creative by others whereas everyday creativity may or may not involve the making of a product.

It is disputed as to whether everyday and eminent creativity are on a continuum or are separate entities (Lubart, 2000-2001). The continuum hypothesis suggests that the factors that contribute to creativity, such as personality traits, are found within all humans but that they are present in greater quantities in eminently

creative people. However, those that support the separate entities theory believe that there are factors that are fundamentally different for eminently creative individuals that are not found in others.

Boden (1998) makes a distinction between psychological (P-creativity) and historical (H-creativity) creativity. P-creativity, which possesses elements of everyday creativity, occurs when someone comes up with an idea that they could not have had before but is known to others. This is frequently observed in children when, for example, they learn how to use a shape-sorter. However, it can also occur in creative adults who discover, for example, a new law in physics only to find that someone else has already discovered this law previously. Thus true H-creativity is a valuable idea that no one else has ever had before (Boden, 1998). This is therefore more likely to become an eminently creative idea if it is socially recognised and valued. However, to say that, for example, Darwin was H-creative and Wallace was only P-creative, although both formulated theories of evolution at about the same time, seems counter intuitive. Surely the difference is more in the opportunities and persuasiveness of the person whose ideas are first socially recognised rather than the creative abilities of the individuals.

Runco (2004) believes that everyone has creative potential but that not everyone demonstrates creative performance. Thus whilst creative potential is necessary for creative performance the latter also requires motivation and ego-strength as well as other attributes to be realised (Runco, 2004). This would suggest that creative ability lies on a continuum with at one end those with relatively low

creative potential and no evidence of creative performance and at the other end those with high creative potential that is not only realised into creative performance but that performance is socially recognised as creative.

Furthermore, evidence that creative ability is present in everyone comes from the use and validation of the Lifetime Creativity Scales (LCS) (Richards et al., 1988). These scales measure creativity without the need for the creative activities to be socially recognised and thus assume that everyone possesses a certain amount of creativity. Richards et al (1988) found that the scales were normally distributed in each of three independent samples thus indicating a continuum of creativity within the general population.

Ward et al (1999:189) suggest that "...the capacity for creative thought is the rule rather than the exception in human cognitive functioning". In fact, all humans, throughout evolution, have needed to both provide and evaluate novel and adaptive responses to everyday situations. Thus, our survival as a species testifies to our everyday creativity.

Although the majority of research is based on eminent creativity this, as Runco (2004) suggests, is often because eminent creators provide unambiguous cases of creative behaviour and ability and are thereby easier to study objectively. Thus the paucity of research on everyday creativity does not mean that this concept is not valid or argues against there being a continuum of creativity. Therefore, this thesis will consider creativity to be present in different degrees within all humans.

## **2.2. ARTISTIC AND SCIENTIFIC CREATIVITY**

Differences between scientific and artistic creativity are often accounted for by either the different demands of the two domains or the personality attributes of the individuals working within the area (the latter is discussed later in this chapter). However, whether individuals with specific characteristics are attracted to different domains or the domains enhance certain traits is yet to be determined.

Gardner (1993) states that it is easier to remain highly creative in the arts than the sciences. Unfortunately, he does not qualify this statement. However, Feist (1999) may provide an explanation when suggesting that science has a greater spectrum of creativity from the mundane to the extremely creative breakthrough whereas the arts tend to focus on a narrower section of the creative spectrum since to be an artist one has to start with a certain degree of creativity. Simonton (1999) further supports this by suggesting that scientists are more constrained in the use of their imagination by the concepts and techniques present in science. Artists on the other hand are required to allow their imagination more freedom. However, artists are also to some extent constrained by previous schools of thought since to produce an original piece of art they need to be aware of what has occurred before and to develop the ideas further or attempt to create something completely new.

Within this chapter the term creative individual will be used to incorporate both scientists and artist unless it is specified otherwise.

### **2.3. IMPLICIT THEORIES OF CREATIVITY**

Whereas explicit theories of creativity are those that have been constructed from data on individuals tested with psychological measures, implicit theories are based on people's own lay ideas of a concept (Sternberg, 1985). Studies of implicit theories of creativity have found differences and similarities between domains as to the perceptions of creativity (Gluck et al., 2002, Spiel & Von Korff, 1998, Sternberg, 1985). In a study by Sternberg (1985) implicit theories of creativity were found to show considerable overlap between specialists in the fields of art, business, philosophy and physics as well as those of laypeople. However, there were also some interesting differences. For example, art professors emphasised imagination, originality and risk-taking whereas physics professors underlined the importance of inventiveness, the ability to find order in chaos and the creative aspects of problem solving.

A further study conducted by Spiel & Von Korff (1998) attempted to identify implicit theories of creativity by profession (politicians, scientists, artists and school teachers), as well as gender and country. Overall there was much more agreement between males and females and between the two countries than between professions, although the countries were Germany and Austria where it would be surprising to note significantly different interpretations. In particular, the degree of ego involvement expressed in their definitions of creativity varied the most between artists and scientists. Spiel & Von Korff (1998) interpret this as due to the different ways that scientists and artists express themselves, with artists using their inner lives within their work to a far greater extent than scientists.

Differences can also be found in different areas of a domain depending on the constraints imposed. Gluck et al (2002) found that “free” artists judged intrinsic motivation to be of less importance and artistic personality of more importance than “constrained” artists who assigned little importance to originality and emphasised problem solving and the value that creative work has for others or for society in general. Thus, Gluck et al (2002) conclude that an individual’s creative style may be an important factor in their choice of work within the artistic domain. This does however assume that these artists entered their professions with an understanding of such constraints. In fact it could also be hypothesised that individuals are more idealistic when entering a profession but those that remain are either better suited to it or adapt their cognitive style to suit the demands of the work.

While Chan & Chan (1999) found almost no sex differences in agreement on whether an adjective was creative or uncreative they did find some cultural differences with Chinese teachers suggesting traits associated with intellectual functioning as being creative that were not identified by US teachers in past studies (Chan & Chan, 1999). Interestingly, differences have also been found between Indian and US teachers and parents although this time it was the US sample who valued intellectual creative traits, as well as attitudinal creative characteristics, more highly than their Indian counterparts (Runco & Johnson, 2002).

Runco & Bahleda (1986) considered implicit theories of artistic, scientific and everyday creativity and found that these theories generated by artists and undergraduates were very similar to explicit theories from the psychology literature. However, Romo & Alfonso (2003) found that the implicit theories regarding artists that were held by students did not coincide with the theories artists held about themselves. For example, the theory that artists have innate talent was absolutely rejected by the artists and the theory of creativity linked to psychological disorder had only very weak support from the artists even though both these theories were supported by the students (Romo & Alfonso, 2003).

Interestingly, in Gluck et al's (2002) study the control group of psychology student appeared to hold a more romantic view of creativity, associating it with positive feelings evoked by the creative act, a view not held by the artists themselves. They also highlighted the importance of the creative personality as defined by artistic talent, unconventionality and readiness to take risks. If this could be generalised to the wider population then it would suggest that creativity is viewed as a desirable ability and therefore artists are considered attractive through a stereotyped image rather than an actual assessment of their characteristics. Furthermore, parents and teachers from India and the United States rated the majority of adjectives that they believed to indicate creativity in children as being desirable (Runco & Johnson, 2002).

Thus, it appears that people have implicit beliefs about highly creative individuals as well as everyday creativity. However, the accuracy of these theories is debatable. Nevertheless, when the implicit theories do not reflect the



empirical findings it is often to the highly creative individuals advantage in the sense that they appear to be more positive than the research suggests.

## **2.4. APPROACHES TO CREATIVITY**

Creativity is often divided into four approaches, which have strongly influenced research and the methods of measurement within the area. These approaches focus on; the environment in which the creation takes place, the final product, the person who is creative, and the creative process that occurs. Each one of these will be considered separately. The majority of the research that will be discussed focuses on eminent rather than everyday creativity. However, this does not mean that many of these factors do not have an effect on everyday creativity.

### **2.4.1. THE ENVIRONMENT**

#### **2.4.1.1. Culture and Society**

A culture defines what is and is not creative and it can promote or inhibit the expression of creativity (Lubart & Sternberg, 1998, Ludwig, 1992). In fact there is some evidence that a society that rewards creativity is more likely to bring it about (Ochse, 1990). However, certain products that severely challenge the cultural norm may initially be rejected and it is not until the culture has been prepared by less extreme forms of the product that it can accept the initial product. If this is the case then this suggests that a creative product needs to differ from its current field in only a small way to be claimed as creative in the current historical period.

The importance that a culture places on a particular domain influences the amount of resources that are accessible. Certain creative endeavours are not feasible without access to capital, such as constructing a cathedral and making a film (Csikszentmihalyi, 1998). Also, a domain's perceived value within a culture, the ease with which an individual can access the domain, and the rewards available when working within the domain all contribute to attracting gifted people into the particular area of creativity (Csikszentmihalyi, 1999). This can produce an initial snowballing effect where the greater the number of individuals attracted to a domain the greater the creative innovations and the more attractive the area becomes to other gifted creators.

Culture not only influences the creative product but also who can take on the role of creator. For example, in the !Kung San, from Southern Africa, creativity in healing ceremonies is restricted to males, whereas creativity in bead weaving is a female pursuit, and storytelling and musical performance are activities for both sexes (Lubart, 1999). This gender division can also be argued to have existed, if it does not still exist, in western society. Here the roles may not be explicitly stated but women are a minority in lists of eminently creative individuals both in the arts and sciences (Gardner, 1993, Simonton, 1999). Another division within the creative role is whether the creative act is a group or individual endeavour. In Bali this is observed in music where groups of musicians are able to express their creativity but individuals are expected to produce stereotyped performances (Lubart, 1999).

Cultures can also define the functions of creative activities. In some societies, both modern and past, creative acts can be used for magical or religious purposes in an attempt to control spiritual or unknown forces (Ludwig, 1992). Another function is to instil fear into an enemy or to act as a display of strength or unity (Ludwig, 1992). Other creative activities, such as story telling, can serve to pass on traditions or knowledge.

The majority of the literature in psychology on creativity has a strong underlying Western bias. Furthermore, the tests used in creativity research are in fact generally measuring a Western defined concept of creativity and are therefore not applicable to non-Western cultures' interpretations of creativity (Niu & Sternberg, 2002). Even what would be considered the most fundamental aspects of a creative product, such as novelty, in Western society may not be valued in creative products in other societies. For example, among the Katanga Chokwe of Africa, creative products are not esteemed for their originality (Ludwig, 1992).

Another factor important to a Western concept of creativity is the relationship to an observable product (Lubart, 1999, Lubart & Sternberg, 1998). The product is considered to be creative only if judged so by certain members of the culture, although who has the authority to conduct the judging is disputed. From an Eastern perspective the product is less fundamental for creativity and the emphasis is focused instead on the personal processes within the mind of the creator (Lubart, 1999; Lubart & Sternberg, 1998). Thus, there appears to be a considerable divide between the Western and Eastern definitions of creativity. Nevertheless, despite this divide there is a consensus amongst Western theorists

that creativity is a universal phenomenon (Brown, 1991, Darwin, 1901, Dissanayake, 1988, Dissanayake, 1992, Mithen, 1996, Power, 1999, Ward et al., 1995). It would be interesting to see whether creativity is considered universal from an Eastern interpretation.

Thus, it can be seen that culture and society play a fundamental role in defining creativity. However, it is important to remember that cultures evolve and so definitions of creativity in a particular culture change over time and as different cultures interact with one another. Therefore, from a cultural perspective a static definition of creativity is perhaps inappropriate.

#### **2.4.1.2. Other Social Influences on Creativity**

There is a large literature on the effect of other social influences on creativity including the home, school, and work environments and access to role models. Whilst the effects of culture will be applicable to an evolutionary model of creativity, since there is evidence of different cultures being present when creative behaviours such as art appear to have arisen, these other social aspects will be less relevant since these are modern day constructions that would not have applied when creative behaviours first arose. Nevertheless, since the following studies use modern day populations to test evolutionary models these other social aspects will presumably play a role in their creative ability and behaviour. However, it should be noted that the research carried out to identify and explore these other social factors is primarily concerned with eminent

creators and so may not be relevant to everyday creativity or even lesser known professional creators.

Furthermore, these social influences are inextricably tied up with the cultural factors discussed above. Thus, while today in Western society such aspects as an intellectually stimulating home environment may play a role in the creative expression of the individual this may actually be a reflection of the ability to access resources. In previous times the status of one's family may have had the same role. Thus, many of these social aspects are just expressions of the present day culture which may have been expressed through different channels in the past. Moreover, the influence that these social factors have on creative ability is likely to be small and may have more to do with increasing an artist's status, through for example good connections, than actual ability. Thus, social factors are not sufficient for creativity and may not even be necessary. Therefore, they will not be examined in further detail.

#### **2.4.1.3. Summary**

As can be seen, cultural factors exert many varied influences on the creative individual. However, the environment is only part of the larger picture that determines a person's creative ability and expression and hence interacts closely with the product, person and process.

#### **2.4.2. THE PRODUCT**

As has already been discussed, from a Western perspective the creative product is central to the definition of creativity. However, current definitions specific to

the product itself are often diffuse and over inclusive. The most commonly used definition is that the product is both novel and appropriate (Amabile, 1983, Brown, 1989, Csikszentmihalyi, 1998, Lubart, 1994, Lubart & Sternberg, 1998, Runco, 1999, Simonton, 1999, Ward et al., 1995). With this definition other factors are sometimes incorporated such as aesthetically pleasing (Runco, 1999), produces surprise or breaks with tradition (Amabile, 1983; Brown, 1989), is complex (Brown, 1989), and is of high quality (Lubart & Sternberg, 1998). Furthermore, a product's creativity is subjective and can evolve through time.

The problem then becomes at what point does a product become creative since it appears that almost anything that is viewed by someone as novel, appropriate, aesthetically pleasing and various other criteria can be labelled creative. If this is the case then the term creative becomes meaningless.

#### **2.4.2.1. Constituents of a Creative Product**

Richards et al (1988) point out that what constitutes a creative outcome varies markedly from accomplishments by eminently creative people to the term applying to the general population. If social recognition is a necessary condition for defining a product as creative then this immediately discounts the majority of everyday creativity. It also excludes products that are not recognised or known by others because the creator does not present them either effectively or at all to the outside world. Nevertheless, Runco (1999) believes that work can be creative even if it is not implemented, recognised or accepted. He states that social judgement does not predict creativity but only impact, which is not always indicative of a product being creative.

A further issue as to what constitutes a creative product is how tangible the product needs to be. In other words, can a good idea be a creative product or does it need to have a physical existence such as a painting? The decisions for such a question are probably strongly influenced by cultural definitions of creativity.

There does however appear to be some agreement as to certain aspects of products, including their ability to stimulate, their originality, and their complexity, that influence creative potential. Ward et al (1995; 1999) have found that even ideas that appear to one domain to be completely new have often been found to have built on ideas and concepts from other domains. This then highlights the need for originality to distinguish the product from previous works.

#### **2.4.2.2. Judges of Creative Products**

There are a variety of groups that could evaluate a product including the creators, experts within the field, peers, work colleagues, teachers, family and friends, and the general public. However the two groups that are most commonly considered in the literature on creativity are the creators and experts. Some feel that successful creators are well equipped cognitively to provide an objective view of their own work (Csikszentmihalyi, 1999). However, empirical evidence has found creators to be very poor judges of which of their products or ideas would be well received (Runco, 1999; Simonton, 1999). Moreover, it has been found that judges of creative products may be poor creators themselves and so an

ability to recognise a product as creative may be a separate ability to being able to produce something (Runco, 1999).

Csikszentmihalyi (1998; 1999) suggests that it is “the field” that determines the creativity of a product. He defines the field as a group of individuals who practice in a given domain and have the power to change it. Whilst certain fields will consist predominantly of experts others that evaluate mass-market products will include not only experts but also the general public. Furthermore, if there are only a few individuals in the field then each person’s opinion will hold much more weight than where thousands of individuals are involved in which case a consensus is required, often by a small sub-group of experts.

There are however a number of criticisms of the reliability of the judgements made by others. Each judge will come from a different background and will have different values, training, past experiences and aesthetic preferences that they will apply when assessing a product (Csikszentmihalyi, 1999, Hocevar, 1981, Lubart, 1994). Hocevar (1981) criticises researchers for their inconsistency in relation to providing definitions of creativity for judges. This then makes it difficult to compare research results and therefore gain a better understanding of what causes a product to be judged as creative. Furthermore, the decision as to a product’s creative impact can vary over time. These inconsistencies make it problematic for creative individuals to receive accurate and generalised feedback as to what is creative (Simonton, 1999). Therefore, whilst a social evaluation of the product is important within a Western context, it



is unable to provide consistent feedback to aid the individual in producing further creative work.

#### **2.4.2.3. Variations in the Quantity and Quality of Creative Products**

It has been demonstrated that in general productive output is related to the age of the creative individual. On average peak productivity is found at around the age of forty (Lubart & Sternberg, 1998; Ochse, 1990). Nevertheless, the exact age of greatest output varies between domains so that fields such as lyric poetry and pure mathematics demonstrate an earlier peak around late 20s and early 30s whereas other fields, such as novel writing and philosophy, show a later peak of late 40s to 50s (Simonton, 1988). The productive output curve then slowly declines until productivity is half of its peak rate (Lubart & Sternberg, 1998, Simonton, 1988). However, there are many examples of creators who are highly productive in old age, such as Michelangelo and Fontenelle. One suggestion why in general productivity declines with age is that motivation and energy levels may decline as the person becomes older although this can be compensated for by experience which presumably reduces the amount of energy required since the creator has found the easier paths to pursue and has contacts that make acknowledgement of work more probable (Ochse, 1990). Another aspect that can reduce output is physical or mental decline. However, Simonton (1988) argues against the explanation of poor physical health by citing Darwin and Beethoven as creators who suffered ill health but continued to produce. Simonton (1999) suggests that those people who have their work recognised and accepted by their field early on will find it easier to have other work accepted

and so will peak sooner than those who are older before their work is first acknowledged.

However, the period the creator has spent within their chosen career appears to be a more important indicator as to when a creative individual will produce a major work (Simonton, 1997). Thus, although it varies to some extent with domain, it appears that it takes approximately ten years before a major work is produced (Simonton, 1999). This is a reflection on the time it takes to build up the necessary knowledge within a field to produce something truly innovative.

There is also a relationship between the quantity and quality of creative products over an individual's lifespan. Simonton (1999:163) calls this the equal-odds rule and states, "...the probability of conceiving a truly successful product is a constant function of the total number of works". Thus, the greater the individual's productivity the more likely they are to produce a high quality product. Furthermore, those that have the highest productivity have been found to be responsible for the majority of the contributions in the field (Simonton, 1988). Thus, Simonton (1997) claims that total number of contributions is the best predictor of eminence, although there are of course individual differences. Richards et al (1988) in their study of lifetime creativity found support for the equal-odds rule as identified by the creative individuals themselves. Interestingly this work considered everyday creativity rather than eminent creativity thus suggesting parallels between the two.

#### **2.4.2.4. Summary**

The product, from a Western perspective, is fundamental to creativity. In fact, it has been suggested that without the creative product a person cannot be thought of as a creative individual regardless of their cognitive abilities (Simonton, 1999). However, defining a product as creative is a difficult task due to the subjectivity of the assessment. Factors such as who are to judge the product, the culture within which the product is made, and the level of creativity required contribute to the problem of definition. What does appear to emerge from the literature is the fluid nature of creativity when applied to the product.

### **2.4.3. THE PERSON**

There are a number of factors that contribute to the individual's ability to be creative. These include personality traits and cognitive abilities such as intelligence, motivation and divergent thinking. These factors have possibly been the most thoroughly investigated, at least since Guilford placed particular emphasis on the study of the creative individual (Guilford, 1950).

#### **2.4.3.1. Personality Traits**

Since the Five Factor Model (FFM) of personality is one of the most commonly used personality inventories then only this model of personality will be discussed within this section.

##### **2.4.3.1.1. Openness and Creativity**

The most consistently found and statistically significant positive relationship between the five factors of personality and creativity is to be found between

openness to experience and creativity (Costa et al., 1984, Dollinger & Clancy, 1993, Dollinger et al., 2004, Feist, 1998, Furnham, 1999, Furnham & Chamorro-Premuzic, 2004, McCrae, 1987, McCrae & Costa, 1997, Nowakowska et al., 2005, Walker et al., 1995). In fact McCrae & Costa (1997) present artists as the archetypal example of individuals high in openness. However, there is evidence that openness to experience is also associated with scientific creativity (Costa et al., 1984, Feist, 1998). Openness may be so important to creative achievement because such individuals are highly motivated to seek out new experiences, they require variety and are tolerant of ambiguity and dissonance (McCrae & Costa, 1997) all of which will promote originality of thought and understanding of many different fields which can be brought together to produce something new within an area of interest. Furthermore, openness is consistently related to measures of divergent thinking, which is necessary for creative thought (McCrae, 1987). McCrae (1987) proposes that being able to think divergently may encourage such people to gain a wider variety of experiences and interests, which would increase their degree of openness.

Furnham & Chamorro-Premuzic (2004) found that openness to experience had a significant relationship with art interests, as measured by the person's background in the arts including their formal qualifications in art, ( $r = 0.40$ ,  $p < 0.01$ ), arts activities ( $r = 0.48$ ,  $p < 0.01$ ) and art knowledge, as defined by the number of art styles the participants knew ( $r = 0.47$ ,  $p < 0.01$ ). When art interests, art activities, and art knowledge were factor analysed a single factor emerged that was labelled art experience. Multiple regression analysis demonstrated that openness to experience was the most powerful and only significant predictor of

art experience from the five factors of personality. However, the ability to make judgements on the quality of the design of the art, as measured by The Maitland Graves Design Judgement Test, was not significantly correlated with openness. This lack of a significant relationship may be due to people high in openness possessing a higher tolerance to ambiguity and the desire for novelty. Since The Maitland Graves Design Judgement Test asks participants to state their preference rather than to identify the “better” design then being open may mean that such people are attracted to the design that is considered of poorer quality due to its less “polished” appearance which stimulates their desire for the unusual.

Dollinger & Clancy (1993) asked participants to provide 12 photographs that described how they saw themselves. These photo essays were then scored on a number of criteria including content of the photo and richness of the autophotographic booklets, which considered the degree of creativity, aesthetics, abstractness, and evidence of self-reflective themes. As was predicted, for both men and women those participants high in openness created the richer autophotographic essays. These results provide empirical evidence that those high on openness produce more creative products. Such a direct relationship has not often been demonstrated in people who are not defined as highly creative.

Furnham (1999) found that there was a difference in the relationship between participants’ openness scores and their self-estimates of creativity and actual creativity scores. What emerged was that openness was correlated with three

different self-estimates of creativity but not with actual creativity of the participant (Furnham, 1999). Further research is required to interpret this result. However it may be that participants believe that their level of interest in creative activities is equivalent to their actual creative ability, whereas to be considered creative also involves many other factors such as motivation, practice and often physical dexterity. Thus, some individuals not interested in creative activities may, when placed in a context where they are required to be creative, be able to be so whereas others who are very interested in creative activities may actually not possess the other attributes necessary for creative production.

However, a study by King et al (1996) demonstrated using multiple regression analysis that openness was the only significant predictor for creative ability and creative accomplishments out of all the personality traits of the five factor model. Moreover further analysis indicated that openness mediated the relationship between creative ability and accomplishments so that even high creative ability resulted in relatively few creative accomplishments unless openness was high (King et al., 1996). This demonstrates not only that creative ability and openness are not the same thing, despite being closely related, but also it highlights the fundamental requirement of openness for recognition as a creator, at least in Western society, due to the creative product's centrality in a definition of creativity.

#### **2.4.3.1.2. Extraversion and Creativity**

There appears to be conflicting results for the relationship between extraversion and introversion with creativity. Some authors have found a significant relationship between these variables (Dollinger & Clancy, 1993, Dollinger et al., 2004, Feist, 1998, Furnham & Chamorro-Premuzic, 2004, Gotz & Gotz, 1973) whereas others have not (Furnham, 1999, McCrae, 1987, Nowakowska et al., 2005, Walker et al., 1995). This may in part be due to the differing measures of creativity used or creative fields considered. Furthermore, different measures of extraversion may place different emphasis on its different facets, with some, such as desire for variety, overlapping with openness (McCrae & Costa, 1987), which may affect extraversion's relationship with creativity. Also, the samples used may also influence the findings. Feist (1998) highlights this when he points out that many of the studies that demonstrated null or negative associations between personality traits and creativity were conducted on general population samples rather than highly creative groups. Therefore, he suggests that certain personality traits in the Five Factor Model may be more strongly associated with eminent creativity than everyday creativity.

Feist (1998) found that scientists were more introverted than non-scientists. Interestingly, when considering the creative versus the less creative scientists he found that the creative scientists were more extraverted than less creative scientists but only on the confidence dimension. The relationship between artists versus non-artists and extraversion was small although the artists were slightly more confident/dominant than non-artists. Feist (1998) concludes that creative individuals are more introverted than controls. However, although the effect is

larger between more and less creative scientists when comparing creative samples with non-creative samples the effect is only really found in the scientists versus non-scientists and is small. It may therefore be that creative individuals do not differ greatly in extraversion compared to controls. However, during the creative process it has been proposed that it is necessary to be both introverted and extraverted at different stages (Feist, 1998). Thus, extraversion is thought to be necessary when the creator needs to promote his product to the outside world and to convince them of its creativity whereas introversion is hypothesised to be beneficial as it allows the creative individual to work through the development phase without interruption. It may also allow the creator to develop their own ideas and confidence in their beliefs without any hindrance from social influence (Feist, 1998). Therefore, when creative individuals rate themselves, or are rated, on extraversion they may not clearly come across as either extraverted or introverted since they may score themselves, or be scored, in the middle of the scale on the extraversion dimensions due to their ability to fluctuate on this personality trait. Another possibility is that they may score on both of the extreme ends of the extraversion/introversion scale depending on the questions asked and so an overall extraversion score would be somewhat in the middle of the range.

Dollinger et al (2004) found that using an undergraduate population as its sample, extraversion demonstrated a relationship between creative interests but not the degree of creative productivity so someone high in extraversion may engage in certain creative activities but it does not bear any relation to how



creative their performance will be. However, the result may be a product of the sample as suggested by Feist (1998) above.

Furthermore, King et al (1996) found that extraversion was significantly positively correlated with creative ability but not with creative accomplishments which should equate closely with the creative product making measures in Dollinger et al's (2004) study. However, extraversion was not found to be a significant predictor of creative ability (King et al., 1996). Thus, whilst there is some relationship between creative ability and extraversion, extraversion does not appear to have an influence on actual production of creative products. Nevertheless, Dollinger & Clancy (1993) found, when asking participants to create autophotographic essays that described themselves, that the richness of the compositions was significantly negatively correlated with extraversion for women although only weakly. Thus, more introverted women created richer, and hence more creative, autophotographic essays.

Contrary to Dollinger et al's (2004) findings, Furnham & Chamorro-Premuzic (2004) found no relationship between art interests or art activities and extraversion. However, their questionnaires were much more limited than Dollinger et al's (2004) and so may not be an effective comparison. Nevertheless, Furnham & Chamorro-Premuzic (2004) did find a significant positive relationship between extraversion and art judgement.

Thus the relationship between extraversion and creativity is unclear. The heavy reliance on correlational studies to understand this relationship as well as biases within samples and the possible fluctuating relationship of extraversion within the creative process may all contribute to the difficulty in understanding the relationship.

#### **2.4.3.1.3. Conscientiousness and Creativity**

Walker et al (1995) found when they compared autobiographical accounts of creative achievers (visual artists and literary figures) and eminent but non-creative achievers (for example army generals and social activists) that creative subjects were significantly lower on conscientiousness than the non-creative group. There is however problems with the distinctions between the two groups as their creative ability was established purely on their profession so that other aspects of their lives were not considered. Furthermore, it is a considerable assumption that social activists, etc are not creative. Nevertheless, other studies have also found a relationship between creativity and low conscientiousness scores (Furnham & Chamorro-Premuzic, 2004; Nowakowska et al, 2005).

Feist (1998) in his meta-analysis also found evidence for this relationship. However, there were differences between the creative fields. Scientists as compared with non-scientists were higher on conscientiousness. However, the creative scientists versus their less creative counterparts were found to be less conscientious. Moreover, artists compared to non-artists were found to be less conscientious. Thus he concludes that creative individuals are less conscientious

(Feist, 1998). Interestingly, the studies where this relationship is not found are where the participants have been from undergraduate or general populations (Dollinger et al, 2004; McCrae, 1987). Thus suggesting that low conscientiousness is a necessary component of the highly creative personality but does not apparently influence everyday creativity.

The negative relationship between conscientiousness and creativity may be because being conscientious can restrict one's ability to think beyond the rules which would make it more difficult to be original in creative work. It may also be due to the possible negative relationship between conscientiousness and general intelligence (Moutafi et al., 2004). If it is necessary to have a relatively high level of intelligence to be creative then such individuals would be more likely to score lower on conscientiousness.

Interestingly, King et al (1996) found that when creative ability was high or moderate then there was a negative relationship between conscientiousness and the creative accomplishments index. This supports the above results regarding a negative relationship between conscientiousness and creativity for highly creative individuals. However, when creative ability was low the relationship between conscientiousness and creative accomplishments was positive (King et al, 1996). This suggests that those who wish to make creative products but are not high in creative ability may achieve this by hard work and perseverance.

#### **2.4.3.1.4. Neuroticism and Creativity**

According to some research there is no relationship between neuroticism and creativity (King et al, 1996) whilst others have found a positive correlation between the two (Feist, 1998, Gotz & Gotz, 1973, Nowakowska et al., 2005, Walker et al., 1995). Gotz & Gotz (1973) and Walker et al (1995) found that more creative individuals scored significantly higher on neuroticism than the less creative group. Walker et al (1995) further divided neuroticism into depressive style, impulsivity and anxiety. When these subdivisions were made it was found that creative individuals from the Arts scored significantly higher than the eminent but non-creative individuals on depressive style and impulsivity but not anxiety. No sex differences were found. They suggest that the increase in depressive style for creative individuals is due to environmental factors, such as loss of a parent in childhood, that are commonly found in the autobiographies of creative individuals. However, this then poses the question of why they are not also more anxious. Furthermore, they make the association between increased impulsivity and hypomania. Such behaviour may help to increase divergent thinking during the early stages of the creative process although actual mental illness is detrimental to creative ability due to the impairment of cognitive processes. In fact, Walker et al (1995) propose that the increased depression and impulsivity may complement each other by preventing either one from overtaking the individual.

However, in Feist's (1998) meta-analysis there appears to be a difference in the level of neuroticism between scientists and artists. Whilst the difference between scientists and non-scientists and creative scientists and less creative scientists in

levels of neuroticism were small if not negligible, there was found to be a more substantial, although still small, difference in levels of neuroticism between artists and non-artists. Artists were found to be higher in neuroticism than non-artists. It may be that the constituents of neuroticism or associated cognitive abilities in some way aid artistic creativity or that The Arts attract more neurotic individuals or allow individuals to express that side of their personality.

#### **2.4.3.1.5. Agreeableness and Creativity**

Finally, evidence for a correlation between agreeableness and creativity appears to be varied. Walker et al (1995) found that their creative subjects were significantly more agreeable than their eminent non-creative subjects. However, their non-creative subjects were in professions where agreeableness may not be beneficial particularly when difficult decisions are to be taken. Therefore, this result may be a product of the sample. Whilst Dollinger & Clancy (1993) did not find that agreeableness correlated with the richness, and therefore creativity, of the undergraduate participants' autophotographic essays it did influence the content. Thus, those scoring higher in agreeableness were significantly more likely to include images of larger numbers of other people.

Feist (1998) did not find a strong relationship between creativity and agreeableness as defined by the Five Factor Model. Nevertheless, there was a small effect of agreeableness between artists and non-artists where the artists were found to be less agreeable. Moreover, King et al (1996) found that those lower in agreeableness scored significantly higher on creative accomplishments

but that agreeableness was not independently a significant predictor of creative accomplishments.

Nevertheless, other studies have found no relationship between agreeableness and divergent thinking (McCrae, 1987), art interests and art judgement (Furnham & Chamorro-Premuzic, 2004), or creative behaviour and creative production (Dollinger et al, 2004). Thus, the relationship between creativity and agreeableness is unclear.

#### **2.4.3.1.6. Summary of Personality Traits and Creativity**

To conclude the section on personality and creativity, it appears that to some extent there can be said to be a creative personality, as defined by the Five Factor Model, that is high in openness, both introverted and extraverted, low in conscientiousness and higher in neuroticism. Nevertheless, since there are conflicting results depending on the sample, type of creativity being measured, and the measure of personality used, further research is required to clarify the personality characteristics of creative individuals.

One aspect that has not been addressed using the Five Factor Model is whether there are personality differences between male and female creators. Ochse (1990) states that both sexes are similar in personality traits with creative individuals of both sexes being more introverted, aloof and self-sufficient than less creative individuals. However, Eysenck (1994) claims that male artists were more introverted and neurotic than female artists when compared to controls.

This difference of opinion may be due to differences in samples. Ochse makes claims for creators in general whereas Eysenck focuses on artists. If personality differences do exist between males and females then the cause may be sociocultural as opposed to genetic. Women may need to be more extroverted and less sensitive to achieve the same status as men within their creative domain.

Whilst the above research often appears to assume that particular personality traits may draw an individual towards a creative career, Ludwig (1992) states that such personality traits may be products of the society that expects, allows and rewards artists for such behaviours and therefore personality traits do not influence creativity but develop once the person enters a creative domain. His evidence for this theory comes from a review of the history of art where there appear to be fluctuations of personality types associated with artistic lifestyles in Europe. Nevertheless, there is believed to be a heritable component to personality traits (Jang et al., 1996, McCrae et al., 2000), which argues against Ludwig's (1992) proposition although it is possible that a creative environment allows behaviours associated with the personality traits to be expressed to a greater extent. However, this raises a further point that the majority of the research on personality and creativity is conducted on Western participants and so may not be generalisable to other cultures.

Personality traits in themselves do not produce creativity. However, without a certain degree of at least some of these traits it is unlikely that a person will become highly creative. Simonton (1999) suggests that there are such a large number of personality traits common to many creative individuals that if a person

lacks some others may compensate for these. In fact, the degree to which someone possesses such traits may influence the creative domain that they enter. Therefore, personality traits can be said to be necessary but not sufficient for creative achievement (Amabile, 1983; Csikszentmihalyi, 1999).

#### **2.4.3.2. Intelligence**

General intelligence (*g*) is a general factor found in a wide variety of intelligence tests (Spearman, 1904) and explain most differences in individual's performances on such tests. Furthermore, *g* is a valid concept that allows one to predict how well people will perform in most areas of real life (Daniel, 1997, Jensen, 1998). Moreover, it has been found that individual differences in general intelligence have approximately a normal distribution, it is stable over the life span and that there is a near-zero sex difference (Carroll, 1997, Gottfredson, 1997, Jensen, 1998).

##### **2.4.3.2.1. Intelligence and Creativity**

It has been identified that a certain level of intelligence is a necessary but not sufficient component for creative achievement (Eysenck, 1994). Furthermore, it has been proposed that there is a minimum of intelligence required for creative behaviour (approximately an IQ of 120) which is known as the "threshold effect". However, beyond this threshold the effect of IQ on creativity appears to diminish (Lubart, 1994, Ochse, 1990, Plucker & Renzulli, 1999, Sternberg & O'Hara, 1999). Statistically this means that there should be higher correlations between intelligence and creativity below an IQ of 120 and lower correlations



above the 120 threshold (Preckel et al., 2006). Since an IQ of 120 is quite high the threshold effect implies that creative individuals usually have high IQs but it does not suggest that all people with high IQs are particularly creative. In fact, there has been some suggestion that people with very high IQs may actually demonstrate reduced levels of creativity because they are rewarded for their analytical skills and so do not invest in developing their creative potential (Sternberg & O'Hara, 1999).

Nevertheless, there are problems with the threshold effect and recent research is beginning to dispute the earlier findings supporting it. One of the main difficulties comes from empirical studies that argue against Spearman's Law of Diminishing Returns. This is the more general rule that the threshold effect rests on, and it states that at higher IQ ability levels other cognitive abilities are not as closely correlated as they are at lower IQ ability levels (Deary et al., 1996, Preckel et al., 2006). Although Deary et al's (1996) study has been used as evidence to support the Law of Diminishing Returns it does not support it for clerical speed and accuracy, mechanical reasoning, spelling and language usage where there is little variance between the two ability groups. Differences in subsets for support of the Law of Diminishing Returns has also been found by Jensen (2003). Furthermore, a study using a large representative sample of Danish men found no support for the Law of Diminishing Returns (Hartmann & Teasdale, 2004).

When the Law of Diminishing Returns was specifically applied to creativity recent research has questioned the threshold hypothesis. Preckel et al (2006) found that the correlations between creativity and intelligence did not differ significantly between the high and low ability groups. This result was supported by a meta-analysis (Kim, 2005). Thus neither study supported the threshold hypothesis. Moreover, this meta-analysis found a negligible relationship between creativity and IQ. Interestingly, Kim (2005) also considered possible moderator variables that could explain the conflicting results for the relationship between intelligence and creativity and found that age and different creativity tests significantly contributed to the variance in the magnitude of the correlation coefficients. Thus it appears that the threshold hypothesis may no longer be a tenable explanation for the relationship between intelligence and creativity.

In fact, despite various studies on the relationship between creativity and intelligence, the exact nature of the relationship continues to remain unclear with the possibility that they are in some way related, are the same concept or have no relation with each other (Sternberg & O'Hara, 1999). Amabile (1983) and Eysenck (1993; 1994) appear to support the view that intelligence is a subset of creativity. However, there are other components involved in achieving creativity that would not be defined by traditional intelligence tests. Therefore, from this perspective intelligence is a necessary but not sufficient condition for creativity (Amabile, 1983, Eysenck, 1993, Eysenck, 1994).

Gardner (1993) proposes that there are seven types of intelligences and that creators differ in the kinds of intelligences that they exhibit. He goes on to propose that creative individuals differ from one another not only in their dominant intelligence but also in the breadth and combination of intelligences. In fact, they are also found to be weak in certain areas, which support the observation that the majority of creative individuals are creative in only one or two areas and may appear decidedly uncreative in others. Examples include Freud who was strong in linguistic and personal intelligences but weak in spatial and musical, and Picasso who was strong in spatial, personal and bodily but weak in scholastic (Gardner, 1993). However, Gardner's intelligences are clearly closely related to creativity and so his definition of intelligence will demonstrate a close relationship with creativity. Thus, it appears that a consensus on the definition of intelligence, and creativity, are required before a clear relationship between intelligence and creativity can be determined. Since intelligence and creativity tests provide their own, often implicit, definitions of intelligence and creativity respectively then this makes it difficult to clearly define the relationship between the two.

Furthermore, openness to experience has been consistently found by a number of studies (Ackerman & Heggestad, 1997, Austin et al., 2002, Bates & Shieles, 2003, Holland et al., 1995, Moutafi et al., 2003) to be the most strongly and significantly correlated domain of the NEO-PI with intelligence. In particular, openness is generally considered to be correlated with crystallized intelligence (Gc) (reasoning that involves a culturally specific component (Searle, 2003))

with the belief that those who are high in openness are more motivated to pursue intellectual activities (Bates & Shieles, 2003). Since this trait is closely associated with creativity it suggests at least that there is some relationship between intelligence and creativity.

Thus, the above discussion suggests that creativity and intelligence are related but are also distinct concepts in their own right. However, the exact nature of their relationship is yet to be discovered.

#### **2.4.3.3. Motivation**

Motivation is an important component of creativity. In fact, Ochse (1990) goes as far as to say that motivation is the major determinant of creative achievement. Motivation not only enables the creative person to persevere during difficult times but it can also promote increased learning of domain relevant skills even before any attempt at developing a creative product is made (Amabile, 1983; Csikszentmihalyi, 1999). There are however two types of motivation, intrinsic and extrinsic.

Intrinsic motivation is "...the motivation to engage in an activity primarily for its own sake, because the individual perceives the activity as interesting, involving, satisfying, or personally challenging; it is marked by a focus on the challenge and the enjoyment of the work itself" (Collins & Amabile, 1999:299). Intrinsic motivation is considered crucial to creative achievement since it enhances

creativity. There is a growing body of empirical evidence to support this statement including longitudinal studies that found that adults that were doing what they loved were more creative in their pursuits. In fact if a person is intrinsically motivated then creativity itself will generate further intrinsic motivation to do the creative activities thus producing a positive feedback loop (Sternberg & Lubart, 1999).

Extrinsic motivation can be defined as "...the motivation to engage in an activity primarily in order to meet some goal external to the work itself, such as attaining an expected reward, winning a competition or meeting some requirement; it is marked by a focus on external reward, external recognition, and external direction of one's work" (Collins & Amabile, 1999:299-300). Traditionally extrinsic motivation has been considered to have a detrimental effect by reducing creativity and there is some empirical evidence to support this viewpoint. Research on the effect of evaluation on children's creativity found that the evaluation inhibited their creativity although the inhibitory effect was observed to be stronger in the older children (Runco & Sakamoto, 1999). This age difference could be explained by the older children being more aware of the requirement to conform to social expectations. Other work has shown that the offer of a reward after completion of a creative task actually narrowed the subjects' ability to perceive alternative solutions and thus produced responses that were judged to be less creative (Amabile, 1983). However, Runco & Sakamoto (1999) criticise these experiments for their reliance on judges to define the level of creativity of a product. Such judgements are open to the biases and

personal interpretations of the judges although a panel of judges from various backgrounds may reduce this problem.

There are a number of suggestions as to why extrinsic motivators reduce creative performance. Amabile (1983) proposes that if externally motivated the individual will pay attention to the aspects of the task that are required to achieve the goal to the neglect of other, possibly more creative, aspects. Another possibility is that people who value external motivators are less likely to continue in a creative activity when the time needed to produce something may be slow and there are the insecurities of lack of financial support and the possibility of failure (Csikszentmihalyi, 1999). However, the apparent dichotomy between intrinsic and extrinsic motivation is not as simple as initially believed. There is now evidence that extrinsic motivation can enhance creativity in certain situations, with particular individuals or with certain extrinsic motivators (Collins & Amabile, 1999, Gluck et al., 2002, Lubart, 1994). For example, those of low ability appear to respond positively to reward, an extrinsic motivator, whereas for high ability subjects the opposite appears to hold (Runco & Sakamoto, 1999). Moreover, if the extrinsic motivator is perceived as a reward it may increase mood levels and thereby increase creativity. Furthermore, if the extrinsic motivator takes the form of constructive feedback or evaluation then this may also increase creativity (Collins & Amabile, 1999). These types of extrinsic motivators may actually have the advantage of reducing anxiety and therefore increasing attention to the task. In fact, Amabile (1983) and Lubart (1994) identify the most important function of motivation as being the way it directs

attention to a task. Those that focus an individual on to the primary aim of achieving the original goal will improve creativity rather than focusing the person's attention on to external goals that may narrow the range of creative expression.

Collins & Amabile (1999) propose that intrinsic and extrinsic motivators are required to differing degrees throughout the creative process. Therefore, early on in the creative process when originality and divergent thinking are required intrinsic motivators will encourage wider thinking patterns. However, later on in the process, particularly when it is slow and difficult, extrinsic motivators may provide the creator with the persistence to continue.

Thus, it can be seen that the relationship between motivation and creativity is more complex than originally thought. However, what is clear is the considerable importance of motivation for creative achievement.

#### **2.4.3.4. Divergent Thinking**

One of the most widely used approaches in the West to studying creativity is the assessment of the cognitive skill divergent thinking. This involves the generation of as many options as possible for a problem or idea (Lubart, 1994). Thus, it is inferred that a person who is able to produce a larger number of responses is more creative than someone who suggests a fewer number of options. However, when tested for divergent thinking it is not only the quantity of responses that are

measured but also the quality since a large number of similar responses would be less creative than a few responses that were distinct from each other. Thus, the components of divergent thinking are considered to be fluency (total number of relevant responses), flexibility (number of different categories of relevant responses), originality (the statistical rarity of the response), and elaboration (amount of detail in the response) (Csikszentmihalyi, 1999; Sternberg & Lubart, 1999). From the description of the components it can be seen that divergent thinking is closely tied up with cultural views of creativity since what is regarded as relevant and statistically rare will vary between cultures. Furthermore, such definitions will also vary between judges of the responses, making it difficult to generalise results across samples.

Divergent thinking has been found to be strongly correlated with openness to experience, as measured by the NEO-PI, across self-reports, peer ratings and spouse ratings (McCrae, 1987). This held for a range of divergent thinking tests and these significant positive correlations were found for each of the facets of openness (McCrae, 1987). However, there were no consistent relationships between the divergent thinking tests and any of the other personality traits of the Five Factor Model (McCrae, 1987).

The relationship between divergent thinking and openness may be due to open individuals being imaginative, curious, preferring variety and having broad interests (McCrae & Costa, 1987) and thus allowing individuals to generate a large number of ideas. Indeed it has been found that divergent thinking actually exerted its greatest effect early in the creative process at the idea generation stage



but does not have a direct effect on the later stages of idea implementation and actual performance (Vincent et al., 2002). This supports the belief that divergent thinking is only part of creative thinking and so a person who has high divergent thinking scores will not necessarily produce anything considered to be creative (Hocevar, 1981, Ochse, 1990, Plucker & Renzulli, 1999).

It has been assumed that divergent thinking is comparable to creative ability. However, divergent thinking without evaluation of the ideas produced will result in many bizarre rather than creative responses. Furthermore, problems with the validity of divergent thinking tests may arise because of their attempts to measure general creative ability. In fact, the issue of whether divergent thinking tests measure actual creativity is one criticism among many that has been made about the tests. Runco & Sakamoto (1999) propose that such tests should be considered as useful estimates of creative thinking potential rather than actual measures of true creativity. Moreover, it appears that divergent thinking is a multidimensional trait since it has been found using a variety of statistical methods that different divergent thinking tests appear to measure fairly distinct aspects of divergent thinking (Clapham, 2004).

Furthermore, it appears that divergent thinking skills may be more relevant in certain creative domains, such as art and problem solving, than others that are more socially based, such as creative leadership (James & Asmus, 2000-2001; Ochse, 1990). This implies that a person with low divergent thinking scores may still be able to achieve creatively. Thus, samples need to be carefully considered before drawing any conclusions about creative thinking ability.

Thus, while divergent thinking is important to parts of the creative process, it is certainly not sufficient for creativity and there is some evidence that it may not even be a necessary component of creativity. Therefore, while considerable resources have gone into using divergent thinking tests to estimate creativity the exact relationship between the two remains unclear.

#### **2.4.3.5. Summary**

There are many facets of the creative individual that contribute to creativity. However, what is evident is that many of these may be necessary but not sufficient for creative achievement. Moreover, certain traits and skills may not even need to be present for the person to be considered as creative. Whether the personal attributes of the creative individual determine the creative domain into which they enter or whether the domain nurtures and encourages the expression of such traits is unclear. Thus, the degree and kind of traits and skills required is complex.

#### **2.4.4. THE CREATIVE PROCESS**

Since this approach can not be directly used in the testing of the sexual selection hypothesis of creativity only a very brief overview will be provided including mention of two commonly cited models.

The majority of the creative process models focus on the thought processes, rather than actions, involved in creativity which raises difficulties as to their

verification. In fact, the primary source of evidence comes from introspective accounts of eminent creators (Lubart, 2000-2001, Mednick, 1962, Simonton, 1999) which therefore rely on purely conscious processes.

The four-stage model is the most commonly cited and consists of preparation, incubation, illumination/inspiration, and verification (Guilford, 1950; Lubart, 2000-2001; Ochse, 1990). Preparation involves defining, setting up, and analysing the problem. The incubation phase is an unconscious working of the problem where the mind identifies and evaluates various associations and combinations associated with the problem. Once the mind has identified a possible workable solution, this solution comes into conscious awareness and is known as the illumination or inspiration phase. This idea is then consciously evaluated and developed during the verification phase.

The Associative model was proposed by Mednick (1962: 221) who defined the creative thinking process as "...the forming of associative elements into new combinations which either meet specified requirements or are in some way useful. The more mutually remote the elements of the new combination, the more creative the process or solution". The greater the number of associations generated the more probable that the individual will find a creative solution (Mednick, 1962). This is because the more associations identified the more likely that one association will stimulate associations from more remote mental domains. This implies that the greater the knowledge an individual has in diverse domains the more likely they are to produce remote associations and therefore the greater the creativity of the end product.

#### **2.4.4.1. Summary**

The above is a very brief overview of the creative process. There are of course other models many of which are variations of the above. These models often do not go into detail as to the cognitive processes involved, which, in part, may be a reflection on the difficulties of testing these theories. This has led Guilford (1950) to dismiss the value of such an approach to creativity. However, the creative process is a fundamental part of creativity. With increasingly sophisticated knowledge and techniques for testing the workings of the mind it may become easier to test the hypotheses proposed for the creative process.

### **2.5 CONCLUSION**

The above discussion highlights the complexity of creativity. Definitions tend to focus on a part of creativity, such as the product or the individual, rather than considering all aspects. Even models that attempt to incorporate multiple components are unable to cover the full spectrum. For example, Csikszentmihalyi's (1998; 1999) systems approach focuses on the interactions between the individual, domain and field but says little about the cognitive creative processes. In fact it is often the creative process that is excluded from any definition of creativity. However, to gain an accurate picture of creativity it is important to include as a minimum the four aspects of the environment, the product, the person and the process.

When considering the environment and the individual it is evident that creativity is a fluid concept dependent on the culture, the historical era, and individual

perceptions. In fact, any discussion of creativity should clearly state the cultural perspective within the study, as this will influence the interpretation of results. Therefore, whilst studies of Eastern products by Western researchers are possible, there is a need to be explicit about the cultural influences of the academics since researchers from Eastern cultures may not consider the products to be creative within their own definition of creativity.

A definition of creativity also needs to incorporate both artistic and scientific domains. Furthermore, since it is generally considered desirable to be creative it becomes almost impossible to identify domains and fields where a person does not consider themselves to be creative. In fact, everyday creativity, when considered in the sense of adapting to new environments and coping with day-to-day problems, suggests that all humans, other than those with certain learning disabilities, are potentially creative. This emphasises the need to consider creativity on a continuum rather than as an either/or concept.

Therefore, creativity is found in the interaction between individual traits, cognitive processes and experiences, which are influenced by the cultural environment of the individual and the society's expectations and definitions of creativity. However, to identify an individual as creative in Western society it is necessary for them to produce a product, which can be judged to be creative or not by the people within the society who are influenced by the product in some way. Since the products can range in their level of creativity, creative ability can be said to lie along a continuum.

## **CHAPTER 3**

### **EVOLUTIONARY APPROACHES TO CREATIVITY**

#### **3.1. AN EVOLUTIONARY FRAMEWORK**

Until recently, evolutionary psychology has failed to contribute substantially to the discussion of creativity. This has meant that the reasons for the evolution and maintenance of creativity in *Homo sapiens* have been largely ignored. Since an evolutionary perspective can lead to a greater understanding of the adaptiveness and primary function of cognitive and behavioural traits such an approach could greatly enhance the current literature.

Since art and artists are often considered archetypal examples of creativity it was decided to concentrate only on evolutionary theories of general creativity and art within this chapter.

##### **3.1.1. Universality**

Before a cognitive or behavioural trait is considered by evolutionary psychology it is important to determine whether it is specific to one or a few cultures, or whether it is a universal characteristic. While a universal trait may have arisen as a by-product or neutral trait, universality may suggest that the trait under review was selected for through evolutionary mechanisms. However, Brown (1991) highlights the fact that human behaviour is so complex and flexible that a trait can only approach universality and that perhaps a more realistic and appropriate definition is that of statistical universal where the trait or behaviour is universal if it is more prevalent than it could be by chance alone (Brown, 1991).

There is substantial evidence from ethnography, archaeology, and ethology that creative products such as painting, dance, humour, and story telling are evolutionary old and universal behaviours (Arnheim, 1988, Brown, 1991, Darwin, 1901, Dissanayake, 1988, Dissanayake, 1992, McBrearty & Brooks, 2000, Miller, 1998, Mithen, 1996, Power, 1999). In fact, Arnheim (1988) and Dissanayake (1988) both claim that all human societies as far as we know, make and respond to art. However, Arnheim (1988) also highlights the cultural variations in artistic production and attitudes towards art and the artist. Thus, he states that environmental factors, such as access to raw materials, and social factors, such as the importance attributed to the arts, play a role in the diversity of art in different cultures.

Miller (2000c) considers the fact that there is individual variation in creative production, with some individuals not participating in such behaviour at all, a problem with claiming that creative behaviour is universal. However, universality does not have to imply that all individuals demonstrate the behaviour but rather that it is universal at a society or cultural level (Brown, 1991). Thus, the fact that, according to Miller (2000c) individuals will specialise in display behaviours, such as artistic production, that they can do well but avoid those in which they are poor does not preclude art as being a universal activity. Moreover, this suggests that the traits required to be creative are present in all individuals but that some of these are more developed in certain people. If this is the case then creative behaviour is universal at the individual level as well.

### **3.2. EVOLUTIONARY MODELS FOR THE EMERGENCE AND MAINTENANCE OF CREATIVITY**

Before considering creativity in light of the sexual selection hypothesis, a brief discussion of other evolutionary models of creativity and art will be discussed.

#### **3.2.1. Creativity and Pretend Play**

Carruthers' (2002) theory of the cognitive basis of creativity is based on a late emergence of creative behaviours at 40,000 years ago, although he acknowledges that the claim to a late cultural explosion is controversial. However, his attempt to address the issue of the gap between the emergence of anatomically modern humans and the creative explosion appears to overshadow a consideration of the reason why creativity evolved in the first place.

If this late emergence of creative behaviour is accepted, the question arises as to how, with the wide dispersal of modern humans, creativity appears to have suddenly emerged independently and more or less simultaneously around the world. Carruthers (2002) proposes that it is the link between childhood pretend play and adult creativity that can explain this incongruity.

Carruthers (2002) claims that pretence and creativity consist of the same basic cognitive abilities, that is "...a capacity to generate and to reason with novel suppositions or imaginary scenarios". Since he focuses on everyday creativity, Carruthers breaks down this cognitive ability into two, the capacity to generate new ideas and the ability to identify and develop the significance of these ideas.



It is proposed that the cognitive prerequisites for creativity were present when anatomically modern humans first appeared but that between this time and the creative explosion there was selection for a predisposition for children to engage in frequent pretend play (Carruthers, 2002). However, since many young animals also engage in pretend play it would be surprising if other young hominids did not already participate in this activity on a regular basis. Carruthers tries to distinguish between animal and *Homo sapien* pretend play by stating that young animals engage in play (e.g. rough and tumble) whereas human children participate in pretence. However, this distinction is not clear and suggests that the play of young animals does not have any relevance to later behaviour in adulthood, which is clearly not the case.

The motivation for engaging in pretend play is, according to Carruthers (2002), the enjoyment and stimulation gained from the activity and the rewarding feelings for children that they are participating in activities not available to them in the real world. However, Carruthers (2002:20) states that these reasons for engaging in pretence explain why children continue to do it but not why they should start it in the first place. He then states that what may have emerged is “..a strong childhood disposition to generate new suppositions and a disposition to begin thinking and acting within the scope of those suppositions”. However, this does not really explain the motivation behind why they started engaging in pretence.

Carruthers is suggesting that creativity is an indicator of intelligence and problem solving ability, and therefore that it would have been selected for through both natural and sexual selection. He attempts to distinguish his theory from Miller's (2000; 2001) sexual selection hypothesis by stating that within his own hypothesis it is not the preference for creative partners that is innate but the ability to link creative thought with problem solving success (Carruthers, 2002:16). However, it is difficult to see how this really differs from Miller's hypothesis since Miller claims that mates are attracted to individuals demonstrating high creative abilities because the creative products act as fitness indicators for traits such as high intelligence.

Finally, Carruthers (2002) argues that children who engage in more pretend play will become more creative adults. Whilst the argument for a relationship between pretend play and problem solving abilities is strong, Carruthers does not explain why the need for increased problem solving ability arose at this point in the evolution of hominids when hominid species, other than *Homo sapiens*, had faced equally challenging environments and had been successful in their own right. The reason could be that it is not until the emergence of anatomically modern *Homo sapiens* that all the other cognitive prerequisites required for the development of human creative thought were present, as discussed by Mithen (1998).

### **3.2.2. Cognitive Prerequisites of Creativity**

Mithen (1998) proposes that the cognitive prerequisites required for human creativity are a theory of mind (TOM), language, a complex material culture

leading to an extended mind, and cognitive fluidity. In fact, according to Mithen (1996; 1998) it is cognitive fluidity that enables the production of creative thought by enabling the mind to combine concepts across the social, technical and natural history domains. The idea of using a material such as stone, which would previously have been used only within the technical domain for tools, as a means of representing ideas from other domains, would have enabled the development of cultural artefacts.

Mithen (1996) proposes that cognitive fluidity began to occur at 100,000 years ago with the emergence of modern *Homo sapiens* and was a gradual process, which was completed between 60,000 and 30,000 years ago. Therefore, creative thought as observed in modern humans was severely limited in other hominids. However, there is evidence that Neanderthals buried their dead and had musical instruments (Akazawa et al., 1995, Bar-Yosef et al., 1992, Hovers et al., 1995, Kunej & Turk, 2000). Whilst it is unlikely that Neanderthals had a fully human-like symbolic capacity, as evident from the appearance of the burials, such behaviour does suggest the beginnings of a symbolic capacity.

Theory of mind, language and a complex material culture leading to an extended mind are, according to Mithen (1998) critical to the emergence of cognitive fluidity. These are all also important elements for creative thinking and behaviour. Studies of autistic children, who lack theory of mind, have demonstrated a link between this cognitive ability and creativity since without a theory of mind their imagination is severely limited, they have difficulty engaging in pretend play, and they are unable to draw imaginary animals.

Mithen (1998) states that theory of mind evolved much earlier in hominids than did creativity since chimpanzees and gorillas appear to have at least a simpler form of theory of mind which suggests that this was also present in earlier human ancestors. Thus, theory of mind is necessary but not sufficient for creative thought.

The existence of a material culture allows the human mind to extend outside of the confines of skin and bone and out into the environment in a lasting form where others can view it who can further develop and extend concepts and ideas (Clark & Chalmers, 1998, Mithen, 1998). Furthermore, a material culture can enable these complex concepts to be remembered (Mithen, 1998). Thus, a material culture enables the extension of the mind which promotes an increased cognitive capacity for creative thought and hence behaviour. Furthermore, Mithen also sees language as important in the evolution of creative thought since it allows not only the individual but a community to explore ideas and concepts to a much greater extent and along with material culture allows the mind to become extended into the material world.

As with Carruthers (2002), Mithen (1998) does not highlight the reasons for the selection of a creative mind other than to suggest that this would have enabled an increase and richness of ideas, which would presumably have improved survival chances. In fact, it is unclear as to whether creative thought is a by-product of cognitive fluidity or if the need for creative thinking led to selection for a cognitively fluid mind.

### 3.2.3. Creativity and Survival

Feist (2001) makes a distinction between creativity selected for by natural selection and sexual selection. He divides creativity into applied forms (technology, science and engineering) and more ornamental forms (art and aesthetics) and suggests that applied forms arose through natural selection and ornamental forms through sexual selection (Feist, 2001). Therefore, if the cognitive processes to produce applied and ornamental creativity are similar then ornamental forms could have developed from the cognitive abilities utilised in applied creativity. This would fit with evidence from the archaeological record that demonstrates that stone tools (applied creativity) are found much earlier in human evolution, between 2 and 3 million years ago, than art, approximately 40-60,000 years ago. However, stone tools made by *Homo erectus* from around 1.4 million years ago show little variation in type for more than 1 million years, which suggests a distinct lack of applied creativity (Mithen, 1996).

Miller, a strong proponent of sexual selection theory, has suggested a natural selection theory for everyday creativity, which he terms “protean behaviour” (Miller, 1997), and sexual selection theory for products produced by eminent creativity (Miller, 1998, Miller, 1999, Miller, 2000a, Miller, 2001). According to Miller (1997) animals that are able to use a degree of mindreading (theory of mind) in their social interactions will also evolve the ability to be genuinely unpredictable (the protean strategy) to outwit a hostile mindreader. However, as Miller (1997) points out, there are a large number of animals without a theory of mind that utilise this strategy in predator prey evasion tactics. In fact, whether any animal other than humans possesses theory of mind continues to be strongly

debated (Byrne, 1995, Heyes, 1998, Povinelli, 1996, Whiten, 1996). Thus, rather than protean behaviour evolving to counterattack the actions of hostile mindreaders, the behaviour may have evolved much earlier on as a behavioural tactic. Once theory of mind did appear protean behaviour may have then been strongly selected for to evolve into a more sophisticated cognitive skill. With the encephalisation of the hominid brain, further cognitive abilities could have evolved that, with the protean strategy, enabled exceptional creativity to evolve and be maintained in *Homo sapiens* through sexual selection.

However, in a later article, Miller (2001) uses the example of male Bowerbirds, who build elaborate nests to attract females to copulate with them, as an example of convergent evolution for art-like abilities. He goes on to say that this provides evidence for human art acting as a fitness indicator in sexual selection. This appears to conflict with his theory for advanced protean thought evolving from a theory of mind and being a prerequisite for exceptional creativity. Whilst Bowerbirds may use random strategies to avoid predators it is highly unlikely that they possess theory of mind or other complex cognitive abilities that are required for human creative behaviour.

#### **3.2.4. Aesthetics**

An aesthetic appreciation may be an early precursor for the evolution of creative abilities. The ability to find something beautiful or ugly can produce powerful positive or negative emotions respectively. These emotions can then trigger appropriate behaviours in response to the object thus enhancing the survival or reproductive success of the individual.

In fact, what is felt to be beautiful, such as high degrees of symmetry in human faces, has been found to indicate high levels of reproductive and survival fitness whereas what is perceived as ugly suggests reduced reproductive and survival fitness (Gangestad & Simpson, 2000, Gangestad & Thornhill, 1997a, Orians, 2001, Thornhill, 1998, Thornhill & Gangestad, 1994). Whilst there are individual and cultural differences in definitions of beauty and ugliness there are therefore also certain universals.

Orians & Heerwagen (1992) suggest that landscape and portrait paintings may be considered beautiful if they portray features that would have indicated survival or reproductive benefits. For example, representational pictures containing water or animals suggest that the environment has plenty of resources to aid survival (Orians & Heerwagen, 1992). However, other paintings, such as abstracts, do not contain such features but are still considered attractive. In these cases the paintings may be seen as appealing to a human desire for novelty and mystery (Thornhill, 1998).

### **3.2.5. Making Special**

Dissanayake (1992) defines The Arts as ways of making important things special and believes that it is this behavioural tendency of “making special” that is subject to natural selection. Making special is achieved by the deliberate shaping or embellishment of an object or action that places it in a realm different from the everyday (Dissanayake, 1988). Such behaviour is achievable by all members of society although some may be more skilful than others. This is a different

concept of the artist than the modern Western viewpoint that believes The Arts to be achievable by a select few.

She considers that The Arts could have been co-opted by sexual selection to act as fitness indicators but that their original function was to allow the expression of powerful emotions that would have brought the group members together and allowed improved transmission of knowledge and values and increased group cooperation and cohesiveness. This would have then led to the survival of individuals within the group by promoting their welfare and reducing anxiety as well as allowing them to form a more cohesive unit that would be more effective in protecting themselves from their enemies. To do this The Arts, such as song, music and dance, were used in rituals to elicit and provide controlled expression of emotions (Dissanayake, 1992).

Dissanayake (1988; 1992) proposes that the very fact that The Arts generate strong emotions suggests that they must have contributed to biological survival since one way of insuring that people continue to participate in a behaviour is for them to experience positive emotions. She claims that The Arts fulfil the other two criteria for an evolved trait: that people spend a large amount of time and effort engaged in the activity and that it is a universal behaviour. However, these criteria do not preclude the possibility of the trait being a by-product.

The activity of “making special” apparently arose as early as 300,000 years ago with the use of red ochre or hematite (Dissanayake, 1992) although an aesthetic sensibility was present much earlier by the time of *Homo erectus* if not *Homo*



*habilis* (Dissanayake, 1988). Dissanayake places this aesthetic appreciation relatively early in human history due to the use of green lava and smooth pink pebbles by some *Homo habilis* toolmakers and the symmetrical handaxes and again the use of attractive coloured stone by *Homo erectus*. However, these judgements of attractiveness are made from the perspective of modern humans. Since the minds and cognition of both *Homo habilis* and *Homo erectus* would have been very different extreme caution should be exercised in making assumptions regarding any aesthetic preferences that they may have had. Moreover, the reason for the symmetry of the handaxes continues to be disputed with the possibility that the symmetry actually improved their functioning rather than being associated with the attractiveness of the object.

Dissanayake (1992) also states that body decoration can be considered as the prototype of the visual arts, which again suggests an early date for its emergence possibly prior to the emergence of Neanderthals. In general Neanderthals are thought not to have possessed fully symbolic minds. However, from the viewpoint of this theory Neanderthals would not have needed to be symbolisers to have appreciated specialness. Nevertheless, Dissanayake (1992) suggests that it was not until Upper Palaeolithic humans became aware of the past and future that there was a need to make things special to deal with the uncertainty that these concepts evoked. Therefore this led to a move to deliberately make things special. However, Dissanayake's use of the term Upper Palaeolithic humans is problematic since it implies that these concepts are only applicable to European hominids since other terms are used for other parts of the world. Therefore, it is difficult to know whether Dissanayake is attributing the concepts of time to

only European *Homo sapiens* or whether she attributes this to all anatomically modern humans, the latter being the only really plausible case.

The arguments that Dissanayake (1992) presents to question art evolving as a sexual display are that sexual selection binds beauty with art which is not the position today, that females may choose their mates on the basis of other attributes than beauty, and that art is more than visual display. In regard to the first issue it is the associations that our hominid ancestors made with art that is relevant when considering the reason for the emergence of art not our modern interpretations. Thus, even if art is not associated with beauty today, which does appear to be a considerable generalisation, if art is an adaptation that evolved through sexual selection in the ancestral environment then the association with beauty should remain when using art as a fitness indicator.

To consider the second point, although beauty may be a basis for mate choice it is not actually claimed that people use artworks to judge an artists physical attractiveness instead there are many other traits, such as intelligence, personality, resource acquisition and creativity that such displays have been hypothesised to indicate (Miller, 2001). The final point that art is more than visual display does not need to be argued against but this does not mean that it does not preclude it being a fitness indicator. It may have a number of functions but it is whether its primary function, in other words the reason selection pressures acted on it, was to act as a fitness indicator that is relevant. Therefore, while it is important to question whether sexual selection is responsible for the

emergence of the arts, Dissanayake's arguments against the theory do not stand up to scrutiny.

### **3.2.6. The Ancestress Hypothesis**

Coe (2003) considers the evolution of traditional art in relation to her ancestress hypothesis with its emphasis on mothering behaviours and kinship. She believes that the move towards a mothering strategy that promoted investing large amounts of resources into a small number of offspring (the K strategy) as opposed to investing very small amounts in a large number of offspring (the R strategy) was the key to many changes in our biology as well as the evolution of human culture. Since modern humans are K strategists this means that those females that chose the K strategy, whilst initially being out-reproduced by the females who utilised the R strategy, have become ancestresses since it is K strategy females who persist today.

Since the K strategy requires considerable resources it is necessary for the mothers to gain social support from other women as well as men and so mothers have built up strong kin networks around them. Women with good social support are more likely to give rise to live, healthy children (Coe, 2003). Traditional visual art is therefore used to identify kin and encourage kinship co-operation as well as to promote the replication of long-term maternal strategies and to teach social norms and behaviour, which include respect for the ancestors and restraint of competition among co-descendents. Visual art, Coe believes, promotes the ideal of the "good mother" by teaching the concepts of generosity and self-sacrifice that Coe feels defines a "good mother". Whilst Coe (2003)

recognises that this term is somewhat controversial she attempts to focus it towards the idea of the mother caring for her child rather than herself so as to ensure that her genes are passed into the next generation. Although care for a child is obviously necessary to ensure it's survival, Coe doesn't consider the necessity of a "good father" or that a mother must care for herself to survive and therefore be able to care effectively for the child.

Coe (2003) proposes that the origins of visual art came from a mother who may, for example, have decorated her children in a particular way to identify them and these children would have passed this on to their children and so on. This decoration could then have been linked with stories of ancestors and their expectations on behaviour.

Coe (2003) states that traditional visual art is social and so differs from the sexual selection hypothesis in that it is not competitive. She also attempts to argue against the sexual selection hypothesis for visual art by claiming that traditional visual art aims to promote long term relationships which she believes conflicts with sexual selection's claims about fitness indicators. However, sexual selection does not exclude this possibility and in fact fitness indicators can be used to assess the qualities of an individual for both a long and short-term relationship.

One point that does cause a problem for the sexual selection hypothesis is the restraint on creativity and the value placed on consistency on the visual arts in traditional societies. However, in many traditional societies certain parts of a

culture may be restricted in the level of creativity whereas in other areas it may be actively encouraged. For example, the Ashanti in Africa are encouraged to be creative when carving secular objects but not when carving religious objects (Lubart, 1999). Therefore, the restraint on creativity in the visual arts in traditional societies may not be as clear-cut as Coe (2003) claims.

Coe's (2003) ancestress hypothesis for the visual arts challenges the assumption common in other hypotheses that men are the predominant creators and originators of visual art. However, in her attempt to include women she has sidelined the role of males in the evolution and maintenance of visual art. Furthermore, her primary source of evidence comes from the ethnographic record, which whilst valuable cannot be assumed to directly reflect the behaviours of earlier hominids. Whilst Coe does consider some visual art from the archaeological record she ignores others including cave paintings which do show evidence of creativity. Thus, Coe's (2003) hypothesis raises a number of points that need to be considered when looking at the evolution of creativity.

### **3.2.7. The Evolution of the Artist**

Lewis-Williams (2002) considers the evolution of Upper Palaeolithic cave artists. His argument centres on Shamanism and the structure of Cro-Magnon society. He considers the archaeological and ethnographic data and a neuropsychological model of consciousness that looks at the levels of altered states of consciousness experienced by humans. From this analysis, Lewis-Williams believes that Shamans who were fixing their visions whilst in altered states of consciousness

onto the cave walls, often near to or where they had experienced them, produced cave art of the Upper Palaeolithic. The images, such as the bison and horses, are therefore not of actual animals but of spirit guides.

Furthermore, Lewis-Williams (2002) suggests that the caves represented part of the tiered cosmos that is a common concept in many religions and is frequently experienced in altered states of consciousness. Thus, entry into the caves would have defined a person's social position with the shamans having access to the deepest sections of the cave and therefore possessing high status within the society.

This hierarchical structure of society was, Lewis-Williams claims, in part developed to enable the Cro-Magnons to distinguish themselves from the Neanderthals who were unable to produce such art because they possessed a more limited type of consciousness. He postulates that the Neanderthals were stuck in the "remembered present" and were therefore unable to utilise dreams and visions, as they would not have remembered them. Any "modern" behaviour, such as the making of perforated pendants and bone and ivory tools, were due to acculturation.

Lewis-Williams' strength lies in his interdisciplinary approach, the limits he places on the generalisability of his theory, and his awareness of the influence that society can have on a researcher's interpretations of the evidence. However, he does not discuss the maintenance of the drive to produce art by some individuals in today's societies. He also leaves it open as to why, approximately

10,000 years ago, cave art appears to have come to an end. Thus, it is difficult to know how relevant his theory is for artists in the present. It may be that the status and power that art conferred to the Upper Palaeolithic shamans is bestowed upon artists today in other ways. Moreover, in the North American ethnographic literature shamans are believed to be especially virile (Lewis-Williams, 2002). Thus, increased status and virility may suggest a link with the sexual selection model.

Moreover, Helvenston & Bahn (2003) criticise the Three Stages of Trance model by claiming that the only things that could have induced the types of trance described in the model were plants that would not have been present in Upper Palaeolithic Europe and so it would not have been possible for the shamans to experience the hallucinations described by Lewis-Williams (Helvenston & Bahn, 2003). This appears to be a serious problem for Lewis-Williams theory.

### **3.2.8. Summary**

There are a number of models, other than sexual selection, for the emergence of creativity. However, few models directly address the selection pressures that would have acted on creative products. Furthermore, a number of the models discussed also incorporate sexual selection within them. Of course, it is also possible that creativity arose as a by-product of other cognitive adaptations such as language or a cognitively fluid mind.

However, as will be discussed below, sexual selection offers a strong theoretical hypothesis for the emergence of human creativity. What needs to be identified

is whether this is borne out empirically since currently there is little research to support or refute the model.

### **3.3. SEXUAL SELECTION THEORY**

Darwin (1871/1901) was one of the first to suggest that physical and psychological traits in humans could have evolved through sexual selection. In fact he states that “higher powers” such as imagination will have evolved partly through sexual selection and partly through natural selection (Darwin, 1901:859-60). However, since Darwin argued that choice came not only from competition but also through female choosiness his ideas on sexual selection were largely ignored for several decades. There is however now renewed interest in sexual selection as a method of evolution and within this field the emergence of human creativity is being considered.

Reproductive success, or the ability to pass on copies of ones genes on to future generations and for these copies to be passed on to the next generation, is not only achieved through natural selection by ensuring survival of the individuals within which the genes are housed, but it is also achieved through sexual selection. Thus sexual selection works by the individual differences in traits affecting access to the quantity and quality of mates available (Gangestad & Thornhill, 1997a).

The two mechanisms of sexual selection which have received most attention are “contests” (also known as intrasexual selection) and mate choice (intersexual selection) although there are others, such as endurance rivalry and sperm



competition, which are also important (Andersson & Iwasa, 1996). However, since the sexual selection hypothesis of human visual art is thought to be brought about by mate choice then this is the mechanism that will be focused on in the following discussion.

### **3.3.1. PROCESSES OF MATE CHOICE**

Mate choice "...is the process leading to the tendency of members of one sex to mate non-randomly with respect to one or more varying traits in members of the other sex" (Kokko et al, 2003, 653). Moreover, this must lead to variation in reproductive success with those individuals that have the preferred characteristics being most successful (Cronin, 1991). To improve reproductive success the "choosy" sex can select traits that indicate direct benefits, so that the trait itself confers an increase in fitness such as greater resources, and/or indirect benefits, so that the trait is directly correlated with a genetic benefit such as high intelligence or creative ability (Kokko et al., 2003).

The most commonly discussed mechanisms of mate choice, which consider the above, are Fisher's runaway process (Fisher, 1930) and the handicap principle (Zahavi, 1975, Zahavi, 1977). Runaway processes are where a particular characteristic of one sex is preferred by chance by the opposite sex. This characteristic is selected for through increased copulations with those possessing the trait. The character and the preference then evolve together. This process escalates until further exaggeration of the preferred trait would mean that the costs to survival would outweigh the benefits of increased reproductive potential (Fisher, 1930). In fact, pure Fisherian traits are not correlated with condition or

quality of the individual and so males with more attractive traits should pay greater costs, such as increased predation risk or greater physiological costs, and should therefore have decreased survival rates despite having increased reproductive success (Jennions et al., 2001). Females are compelled to join in once the process has began, to ensure that their sons inherit the trait and are therefore chosen as mates. Fisher's model has received support in a number of studies (for examples see (Cronin, 1991, Maynard Smith, 1985, Pomiankowski, 1987a, Pomiankowski, 1987b). However, it is often forgotten that Fisher (1930) also proposed that the "choosy" sex should prefer mates who are healthier and have increased longevity and that attractiveness might therefore indicate increased viability (Kokko et al., 2003), which leads on to the handicap model.

Since the handicap principle was first proposed by Zahavi in 1975 there has been a number of studies which have provided support for the model (Iwasa et al., 1991, Jennions et al., 2001, Kodric-Brown & Brown, 1984, Maynard Smith, 1985, Nur & Hasson, 1984, Pomiankowski, 1987a, Pomiankowski, 1987b). The handicap principle works by a particular characteristic indicating the level of an individual's fitness (for example health, intelligence, creativity), which enables the selecting sex to select the best mate through assessing the quality of the trait (Zahavi, 1975). These characteristics which evolve through mate preference must confer a handicap to survival on the individual to act as "honest indicators" so that only the best quality individuals can survive with the handicap (Zahavi, 1975). The handicap is often directly correlated with the quality of the trait, for example a bird's bright plumage may indicate good disease resistance since disease and parasites can adversely affect the quality of the feathers. A low cost

handicap would enable cheats to fake the handicap and therefore gain matings without passing on the benefits. Whilst those without the handicap will be fitter than those with a handicap, they will attract less matings and therefore are less likely to pass their genes onto future generations.

However, whilst there has been support for the handicap principle this has not been without certain caveats being added and in fact three different types of handicaps have been proposed (Iwasa et al., 1991, Maynard Smith, 1985, Pomiankowski, 1987a). The first is the pure epistasis handicap (also known as Zahavi's handicap) where there are strong viability interactions between the genes for the handicap and those for survival which will result in natural selection acting on those with low viability so that only high viability males with the handicap survive.

The second type of handicap is the conditional or condition-dependent handicap. Here the handicap is only produced in the first place by those individuals with high overall fitness (Pomiankowski, 1987a). Thus, individuals who choose those possessing the handicap will be mating with those who have high viability. However, with the third type of handicap, the revealing handicap, all males produce the handicap and the condition of the handicap accurately indicates the quality and viability of the individual (Pomiankowski, 1987a). However, as Pomiankowski (1987a) highlights these three types are not mutually exclusive.

When Iwasa, Pomiankowski et al (1991) used mathematical modelling to identify whether these three types of handicap could explain the evolution of

costly mate preferences they found support for the condition-dependent and revealing handicaps but not for the pure epistasis handicap. The reason for the lack of support for the latter model was due to the requirement of a direct relationship between general viability and the size or condition of the mating characteristic (the handicap). This is present for the condition-dependent and revealing handicaps but not for the epistasis model since the preferred trait does not reflect general viability but rather only directly reflects the value of the trait itself (Iwasa et al., 1991).

If art is under the process of the handicap principle then it is more likely to act as a condition dependent or revealing handicap rather than adhering to the epistasis model since those who are not able to produce high quality art are not therefore weeded out by natural selection. However, since there is an element of choice as to whether an individual produces art, or indeed any creative product, then it makes it difficult to determine which of these processes are most applicable.

Although runaway processes and the handicap principle are often viewed as opposing it is possible for them to work together on the same trait since a trait that is aesthetically pleasing and indicates a good quality genotype will be selected for by both methods. Pomiankowski (1987a, 1987b) used mathematical modelling to demonstrate that this was the case. In fact, he showed that a combination of both processes will allow for the stable exaggeration of mate characteristics in the presence of costly female choice which is not possible when only runaway processes or the handicap principle are acting alone (Pomiankowski, 1987b).

More recently, Kokko, Brooks et al (2002) have proposed a sexual selection continuum with the runaway model (increased mating success) and good genes model (increased mating success and increased survival) representing the two ends of the continuum. Using a mathematical model they demonstrate that female choosiness on the continuum varies according to the costs involved in making the choice due to environmental factors, such as the presence of predators, which may alter the costs of searching for a mate. Thus, when female costs are low they will tend to produce a skew towards the “runaway” end of the continuum due to a strong preference towards wanting “sexy sons”. However, this is rarely observed in nature since low female cost is very unusual (Kokko et al., 2002).

### **3.3.2. COSTS OF THE HANDICAP**

As Zahavi points out, the costs of developing and maintaining a handicap do not need to be high since the expression of the trait is correlated with the individual's ability to bear the costs (Zahavi, 1977). In fact, Kodric-Brown & Brown (1984) state that while certain traits may reduce survival in favour of mating success others may act as mechanisms for both natural and sexual selection thus enhancing both survival and mating success. For examples the size of deer antlers have a positive relationship with social status, nutritional condition, reproductive success and longevity (Kodric-Brown & Brown, 1984). However, they are costly in terms of metabolic costs and so do act as honest indicators of fitness. Moreover, mathematical modelling, has also provided support for a positive relationship between an increased handicap and greater survival despite

the handicap being used as a mechanism for both natural and sexual selection (Nur & Hasson, 1984).

Also, Jennions, Moller et al (2001) through a meta-analysis provide support for the proposition that handicaps do not necessarily need to impose a cost on survival. They demonstrated a statistically significant trend for a positive relationship between the expression of a trait and survival (Jennions et al., 2001). In fact they state that the relationship between longevity and lifetime reproductive success is such that those individuals that are displaying higher quality traits, and are therefore more viable, need to have an increased lifespan to attract more mates. However, the majority of the study samples consisted of birds and insects/spiders. Thus, more work is required on mammals to confirm the relationship across classes.

However, it should be remembered that some sexually selected handicaps do reduce survival. In fact, in Jennions et al's (2001) meta-analysis, although the majority of the studies, samples and species studied did demonstrate a positive relationship between these variables, there were others that showed negative relationships. Furthermore, work on ornamentation in guppies has provided evidence for strong negative correlations between attractiveness and survival (Brooks, 2000).

#### **3.3.2.1. Costs of Creative Production**

Miller (2000) discusses costs of creative production in terms of time, energy, skill and resources. However, Kotiaho (2001a) makes an important distinction

between expenditure and costs. From an evolutionary viewpoint, costs are measured in terms of increased mortality and decreased reproductive success (Kotiaho, 2001a), although this argues against some of the above findings. Therefore, whilst the increased use of resources such as time, energy and skill will drain individual resources from other activities they do not necessarily impose an evolutionary cost.

Thus, if creativity is to be explained through the handicap principle evolutionary costs rather than expenditure must be present. An individual who becomes so involved in creative endeavours that excessive time is taken up with the creative enterprise could develop poorer health through neglect, which may reduce his/her life expectancy. However, as long as he/she lives long enough to reproduce then in evolutionary terms they have been successful to some degree.

Nevertheless, a more viable cost to exceptional creativity is its genetic links to schizotypy and therefore mental illness (Nettle, 2001, Simonton, 1999). In fact, Kotiaho (2001a) identifies genetic costs that reduce fitness in offspring as being indirect evolutionary costs. Whilst the apparent costs of schizotypy are high when mental illness develops there appears also to be some benefits associated with divergent thinking which enables them to possess more flexibility and originality of thought. Whilst people who experience psychotic illnesses can be extremely disabled by the thought disorder that emerges, it is obviously a great advantage for creative thinkers to possess a high degree of divergent thinking without becoming unwell.

Furthermore, there are also reproductive costs for individuals with schizophrenia and schizotypal personality disorders. These illnesses are characterised in part by problems with relationships, social detachment, and reduced sexual interest (Stuart & Sundeen, 1991). Such individuals have been found to have significantly reduced rates of reproduction compared to the general population which although in part may be due to these behavioural and emotional components appear also to be associated with the genetic load associated with the illness (Avila et al, 2001). Although lower reproductive success should ultimately lead to a reduction in the prevalence of the disorder there actually appears to be a stable prevalence of approximately 1% across cultures over time (Avila et al., 2001, Bassett et al., 1996, Shaner et al., 2004). This apparent paradox has led to suggestions of possible survival or reproductive advantages to those who possess the genotype but not the disorder such as close relatives of schizophrenia sufferers.

In fact, Avila et al (2001) found that the parents of those with schizophrenia had significantly greater reproductive success than those parents without any offspring suffering from schizophrenia. However, Avila et al (2001) do not consider whether there are particular factors involved in promoting reproductive success and why there is evidence of compensatory reproductive fitness among these relatives. For example, it may be that certain behaviours that are enhanced because of the genotype, such as creative production, may be being used to attract more sexual partners or better quality individuals and thereby improving their reproductive success.



Shaner et al (2004) propose that schizophrenia is the low fitness end of a mental trait that evolved as a fitness indicator through mutual mate choice. Their findings support this claim since the onset of schizophrenia coincides with that when courtship generally begins to occur, it affects the probability of gaining and retaining mates, there are sex differences in its occurrence, it is associated with increased developmental abnormalities, there is substantial heritability, increased reproductive success in unaffected relatives, and those with schizophrenia are generally considered to be unattractive and undesirable as sexual partners (Shaner et al., 2004). However, Shaner et al (2004) appear reluctant to commit as to precisely what the fitness indicator is that schizophrenia is the unattractive extreme of although they do suggest that it may be verbal courtship behaviours, which they imply is a creative behaviour.

Nevertheless, other studies have found a more direct link between creative activity and schizotypy traits (Nettle, in press). In fact Nettle (in press) found that the unusual experiences sub-factor of schizotypy was elevated in poets and visual artists to the same range as for schizophrenic patients. However, these creative individuals had lower scores than the controls for introverted anhedonia (another sub-factor of schizotypy, which is characterised by a lack of enjoyment especially in social activities) thus possibly cushioning them from becoming unwell.

However, O'Reilly et al (2001) also considered the relationship between a number of creativity measures and schizotypy in undergraduate students either studying for a humanities or creative arts degree. They found that unusual

experiences scores was a significant predictor of willingness to engage in the verbal arts (creative writing and reading) and that, when degree subject was taken into account, there was no direct relationship between any of the schizotypy scores and divergent thinking. They therefore conclude that unusual experiences scores may motivate participation in particular creative fields but not the ability to think divergently (O'Reilly et al., 2001). Nevertheless, this does not detract from the fact that there appears to be a relationship between creativity and schizotypy and therefore schizophrenia.

Interestingly, both level of creative involvement and schizotypy have been found to share a relationship with mating success (Nettle & Clegg, in press-b). In a study by Nettle & Clegg (in press-b) it was found that unusual experiences had not only a positive effect on mating success via creative activity but it also had a significant positive effect on numbers of sexual partners independent of degree of creative engagement (Nettle & Clegg, in press-b). Thus, unusual experiences, a sub-factor of schizotypy, and level of involvement in poetry or art appear to enhance reproductive success through ability to attract numbers of and therefore possibly higher quality partners. This provides strong support for the sexual selection hypothesis of creativity.

Therefore, the risk of developing, or one's offspring developing, a psychotic mental illness is a genuine evolutionary cost since such illnesses can reduce an individual's lifespan either through suicide or poorer physical health and/or reproductive success. However, the benefits of creative behaviour and the

association with increased mating success for those who share some of the schizotypy genotype help maintain the genotype within the human population.

### **3.3.3. COSTS TO CHOOSINESS**

Pomiankowski (1987b) categorises mate choice costs into four types; predation risks, risks of disease transmission, loss of time and energy costs. Predation risks can occur when an individual is signalling that they are ready to assess mates and this signal also highlights the animal's presence to predators. Furthermore, certain animals when copulating are more at risk from predators since they are unable to escape as quickly (Pomiankowski, 1987b). Whilst this may not appear to be relevant to humans there may still be an increased risk of violence, since females who use short-term mating strategies have been found to be at greater risk of physical and sexual violence (Buss & Schmitt, 1993).

For humans the risk of venereal disease increases with multiple sexual relationships (Daly, 1978, Pomiankowski, 1987b). However, even with one sexual partner there is a risk of sexual disease transmission depending on their previous sexual history. Thus there is also a cost to assessing the likelihood of a mate having such a disease since this may increase the time needed to choose a mate. Being too choosy in the search for a mate will lead to a loss of time which if prolonged may mean a reduction in fecundity (Kokko et al., 2003). Loss of time can also be incurred if an individual initially accepts a mate and then after further assessment of their qualities rejects them.

Furthermore, choosing a mate can be hugely expensive in terms of energetic costs. It has been found that in a number of small mammals females will travel extensive distances to find a mate (Daly, 1978) and this can also be applicable to humans. Furthermore, resistance of mating attempts can require considerable amounts of energy and also increased probabilities of injury (Pomiankowski, 1987b). Moreover, the “choosier” sex in mate choice may be equipped with specialised physiological or psychological capabilities to discriminate between mates and these design features are often costly in terms of energy to produce and maintain (Pomiankowski, 1987b).

In terms of art as a fitness indicator, it would appear that its use in mate choice would involve high costs to those using it to assess the artist’s qualities. These individuals will often need to travel sometimes quite large distances to view the art and they will require cognitive mechanisms to be able to accurately use the artwork as a fitness indicator. They then need to meet the artist where further assessment of the artist’s qualities is required. All of these factors will be costly in terms of energy and time. However, if artworks do work as fitness indicators using them as such may reduce search time by narrowing down the time taken to meet the individuals, particularly if several artists’ works are displayed together. Furthermore, it may reduce the cost involved in forming a partnership with the artists and then finding that they are not desirable partners.

#### **3.3.4. MULTIPLE CUES IN MATE CHOICE**

The use of several sexual ornaments in courtship display is found to be common in many species including humans (Candolin, 2003, Iwasa & Pomiankowski,

1994, Johnstone, 1996, Miller & Todd, 1998). These multiple cues may work by indicating different qualities of the individual and so taken together provide information regarding overall quality or some cues may indicate long term condition and others reflect the present condition of the bearer (Candolin, 2003). Furthermore, those choosing mates may use certain cues to assess direct benefits, such as investment in parental care, whilst other cues may indicate genetic benefits. Moreover, different environments may favour different phenotypes, and therefore genotypes, and this may also affect the preference given to different cues (Candolin, 2003).

Johnstone (1996), by using mathematical modelling, found that those employing multiple signals may employ only the signal that indicates the quality that the individual most excels at. This may be seen in humans where some individuals may “signal” their resources more whereas others may “signal” creative ability more (Miller, 2000c). Of course humans can have both status and creativity and may display both at the same time or at different times depending on, for example, their mating strategy (short or long term).

Iwasa & Pomiankowski (1994) demonstrate that the evolution of multiple cues via the handicap principle is dependent on the cost of female choice. Thus, if the overall cost of choice for the female is not greatly increased by assessing more than one trait then multiple displays can evolve as a stable strategy. However, once the costs of choice increase only a preference for single cues becomes stable (Iwasa & Pomiankowski, 1994). Thus, if the costs of choice influence the evolution of multiple cues then they are likely to be present in social species

where males and females spend time together outside of the breeding season and the cost of mate choice may therefore be low (Candolin, 2003). This is applicable to humans since men and women spend considerable time together outside of a woman's fertile period. This may have therefore allowed the costs of assessing multiple cues to be low enough for their evolution within *Homo sapiens*.

Interestingly, Miller & Todd (1998) consider the use of multiple cues, such as physical attractiveness, intelligence, social status and personality, in humans. Initially they looked at the cue integration model. This involves an individual combining information on all cues to gain an overall mate value, which is then used to determine whether to have some sort of sexual relationship with the potential mate. However, this type of model assumes that all cues will be present simultaneously, which is rarely the case particularly since some cues, such as physical attractiveness, are quickly assessed whereas others, such as neuroticism take much longer to accurately judge. A further assumption is that lack of one quality can be compensated for by another. However, this may prove maladaptive if for example creativity could compensate for physical cruelty (Miller & Todd, 1998).

Miller & Todd (1998) therefore go on to consider what they believe to be a more plausible model, the sequential aspiration-level model. With this model each cue can be assessed over different time periods rather than all together. The signalling individual is required to obtain a particular level of each trait for the assessing individual to continue onto the next stage of courtship. With the

assessment of each cue the individual determines the type of relationship that they will have with the potential mate. Thus, if the signalling individual has the required level of physical attractiveness then the assessor will engage them in conversation. This will lead to an evaluation of the signaller's level of social status which could lead to dating followed by an assessment of the potential mate's level of intelligence which if acceptable may lead to exclusive dating and so on (Miller & Todd, 1998). The levels required by each trait will be determined by factors such as the assessors own mate value, intended mating strategy, sex, and environmental/social context. Whilst in many ways this model appears overly simplistic it may provide a way of understanding the sort of mechanisms that are used in mate choice. Moreover, there is some empirical support for this model (Li et al., 2002).

Candolin (2003) suggests that the use of multiple cues in sequential models of mate choice can reduce the costs of choosing mates. Using this method, initially the individual doing the choosing is only required to assess one cue. If the potential mate does not meet the required standard for this trait then the assessor need not expend further energy judging further cues. Thus, multiple cues may evolve in species where mate choice costs are high as a way of lowering these costs (Candolin, 2003).

However, multiple cues may have other functions. Candolin (2003) suggests that multiple cues may be used as back-up signals so that each cue signals the same aspect and this then reduces mate choice error. This may also prevent cheaters attempting to replicate indicators of high quality due to the higher costs of

producing multiple cues. However, Candolin (2003) believes that multiple cues are less likely to act as back-up signals as the majority of studies have found multiple cues to be uncorrelated. However, Johnstone (1996) states that it may in fact be difficult to distinguish between backup signals and multiple messages. Furthermore, multiple cues may work so that some of the signals serve to enhance or amplify the display that is indicating a particular quality or help the choosing individual to detect the relevant cue (Candolin, 2003).

### **3.3.5. HERITABILITY OF FITNESS AND THE LEK PARADOX**

If those choosing mates are doing so to gain “good genes”, as defined by the handicap principle, then there must be detectable variation between potential mates. However, the preference for high quality traits should cause directional selection so that the desired alleles become rapidly fixed in the population thus reducing genetic variation. If this occurs then there would be no benefits to choice since all potential mates would possess the desired characteristics. Nevertheless choice and genetic variation persists and this is known as the lek paradox (Kokko et al., 2003, Kotiaho et al., 2001b, Miller & Todd, 1998, Pomiankowski & Moller, 1995, Rowe & Houle, 1996, Tomkins et al., 2004). In fact, Pomiankowski & Moller (1995) used comparative data from a wide range of species of insects, fish, birds and mammals and found that the sexual traits considered not only demonstrated genetic variance but also had greater genetic variability than comparable non-sexual traits.

The condition dependent model may provide a resolution to the lek paradox. This assumes that display traits are costly to produce and so depend on overall



condition and not just the quality that they are indicating, which may be under the influence of relatively few loci. Since overall condition is associated with a large number of loci this will therefore provide a large mutation target thus allowing for the genetic variance required to resolve the lek paradox (Kodric-Brown & Brown, 1984, Kokko et al., 2003, Kotiaho et al., 2001b, Rowe & Houle, 1996, Tomkins et al., 2004). It is important to note that the term condition within this model is more narrowly defined as "...the amount of resources available for allocation to fitness-enhancing traits" (Tomkins et al., 2004, 324). Therefore, phenotypic indicators of condition will provide evidence of either ability to acquire resources, such as muscle mass or certain personality traits, or actual resources available such as amounts of carbohydrates in the body. Thus, since increased investment to sexual displays leads to enhancement of the display and this is less costly to do for those individuals with more resources then covariance between the display traits and condition evolves through sexual selection (Tomkins et al., 2004).

Another possible answer to the lek paradox is the interaction between the genes and the environment. Thus attractiveness of a potential mate is not absolute but rather is dependent on the particular environmental context and so can, for example, change overtime or in geographical locations or habitats (Kodric-Brown & Brown, 1984, Kokko et al., 2003). These changes may be able to maintain enough genetic variation of display traits to make mate choice beneficial. Moreover, the presence of multiple signals and differing mate preferences within a species may also maintain genetic variation in sexually

selected traits since different individuals will want differing amounts of various cues within their mates (Candolin, 2003).

The above explanation is also known as fluctuating selection since the optimum phenotype varies in time or space (Tomkins et al., 2004). One commonly cited example of this was proposed by Hamilton & Zuk (1982). They claimed, and then went on to empirically test, that the interaction between parasites and their hosts produce cycles of coadaptation and so the evolutionary arms race that occurs provides enough genetic variation to partly resolve the lek paradox (Hamilton & Zuk, 1982).

### **3.3.6. PARENTAL INVESTMENT AND MATING STRATEGIES**

Trivers (1972) defined parental investment as "...any investment by the parent in an individual offspring that increases the offspring's chance of surviving (and hence reproductive success) at the cost of the parent's ability to invest in other offspring" (Trivers, 1972, 139). Since human females invest the most prior to, and often after the birth, of the young then, although there is high parental investment by human males relative to many other mammals, men are considered to be the less investing sex. This imbalance between the sexes means that those who invest less (men) can increase their reproductive success by attracting and mating with a greater number of those individuals who invest more (women). Thus, when there is a difference in the levels of parental investment between the two sexes of a species, there tends to be a difference in the strategies to maximise reproductive success (Trivers, 1972).

The sex that invests less (males) is usually more motivated towards short-term mating to maximise numbers of progeny whereas the sex that invests more (females) is more focused on gaining long-term mates that are willing to invest in the upbringing and thus survival of the female and her offspring. Nevertheless, as Trivers (1972) identifies, where there is strong selection for male parental care the mating strategy of the male will probably be mixed so that males will desire and have long-term relationships within which they will invest whilst also not passing up the opportunity for short-term relationships in which they will provide little or no investment.

Since the primary problem for men to increase their reproductive success is to gain access to large numbers of fertile women, men should possess psychological adaptations that will aid them in achieving this goal including that men possess a greater desire for short-term sexual relationships, that they prefer larger numbers of sexual partners over time, and that men require less time before consenting to sex than women (Schmitt et al., 2001). With reference to the first proposed mechanism, there are a number of studies that have found a significantly increased desire for short-term relationships in men compared to women (Buss & Schmitt, 1993, McBurney et al., 2005, Schmitt et al., 2003, Schmitt et al., 2001) and that men more than women actually act on these desires (Oliver & Hyde, 1993, Wiederman, 1997). Moreover, there is evidence for this pattern being found cross culturally (Schmitt et al., 2003). Furthermore, with regard to the second mechanism, men have been found to significantly prefer and actually have a greater number of sexual partners over time than women (Buss & Schmitt,

1993, McBurney et al., 2005, Oliver & Hyde, 1993) and that this is found cross-culturally (Schmitt et al., 2003).

The prediction of sex differences in time required before consenting to sexual intercourse is also supported with men requiring significantly less time than women before consenting to sex (Buss & Schmitt, 1993, Schmitt et al., 2003, Schmitt et al., 2001). However, there is evidence of some effect of culture depending on sexual attitudes, sex ratios, fertility rates, and prevalence of sexually transmitted diseases (Schmitt et al., 2003).

Whilst men are adapted towards a more short-term mating strategy than women, this does not mean that there are not costs to men of engaging in this strategy. For example, short-term sexual relationships can lead to an increased risk of sexually transmitted infections and violence from husbands and/or relatives of the woman. Also men who gain a reputation for being promiscuous may find that their mate value is impaired and so may find it more difficult to gain a long-term partner (Buss & Schmitt, 1993).

Therefore, men may also, or instead of, engage in a long-term mating strategy. This has the advantages of enabling them to increase the phenotypic quality of their offspring to further the offspring's chances of survival (Gangestad & Simpson, 2000). They can also increase their offspring's genetic and phenotypic quality by focusing on quality of their mate as opposed to quantity of mates. Furthermore, a long-term strategy means that a man can be surer of paternity and

can solve the problem of concealed ovulation in females as well as being able to form long-term alliances with the woman's kin (Buss & Schmitt, 1993).

Women, on the other hand, are predicted to be more orientated to long-term relationships than men due to their increased parental investment and evidence for this can be seen in the above discussion. The costs of production of the egg, fertilisation, pregnancy and birth are large and so for a female to then not invest further in the offspring would mean that she would waste the investment she has made so far (Trivers, 1972). However, since for human females the costs of the investment means that, particularly in the ancestral environment, it is more difficult to gain food and shelter and women become more physically vulnerable, especially during pregnancy, then a long term partner can provide protection and resources to ensure that the woman and the offspring survive. Evidence for women desiring resources in long-term mates was found in a study by Buss & Schmitt (1993) and mate preference studies demonstrate that resources or the potential to acquire them are consistently significantly preferred in a mate by women more than men (Buss & Barnes, 1986, Hatfield & Sprecher, 1995, Li et al., 2002, Toro-Morn & Sprecher, 2003).

Nevertheless, women also engage in short-term relationships and this is considered by sexual strategies theory to be an evolved strategy rather than behaviour engaged in by only a few possibly "dysfunctional" women (Schmitt, 2005). Evidence that short-term mating in women is an evolved mechanism comes from a number of findings. Physiologically there is evidence of sperm competition in humans that would indicate that the ancestral condition for

women would have included short-term matings (Greiling & Buss, 2000). Furthermore, the fact that men experience jealousy that is particularly associated with sexual infidelity by their partner suggests that this may be an evolved mechanism to prevent women from sexually straying which would have only evolved if short-term sexual relationships were relatively common for women (Greiling & Buss, 2000). Moreover, although men were found to engage in extra-marital sex significantly more than women, in one study 11.6% of the female participants (N = 1288) stated that they had engaged in extra-marital sex at some point in their lives (Wiederman, 1997). Also, evidence from paternity testing is demonstrating the extent of short-term relationships and extra-pair copulations by women since between 3% and 27% of tests show paternity discrepancy (Bellis et al., 2005). Furthermore, Schmitt et al (2003) found that across ten world regions women on average scored higher than one (not at all currently seeking) on a measure of short-term seeking thus suggesting the desire for short-term relationships by women across cultures.

However, a woman's motivations for pursuing short-term sexual relationships are likely to be different to those of males (Schmitt et al., 2001). Greiling & Buss (2000) found that the hypothesis that received the strongest support as to the benefits of extra-pair liaisons for women were the mate switching hypothesis (short-term matings will allow her to assess a man as a potential long-term mate, and/or get rid of her long-term partner) and the resource acquisition hypothesis (women gain immediate resources, protection and/or status elevation, and may also gain investment through paternity confusion) (Greiling & Buss, 2000).

Unfortunately, the possible genetic benefits were not tested and so this study cannot support or refute this hypothesis.

Since evidence suggests that females may be engaging in short-term sexual relationships to gain longer term partners, then the good-genes hypothesis, where women are looking for increased genetic quality for their offspring, may provide an explanation for female preferences when women already have a long-term partner. Gangestad & Simpson (2000) suggest that there is evidence of good-genes selection by women by considering the data on fluctuating asymmetry and sexual behaviour in humans, although their predominant use of correlational studies and the low correlations within these studies have been criticised (Archer & Mehdikhani, 2003). Furthermore, evidence that women experienced significantly more orgasms the more symmetrical the man and that orgasms close to ejaculation, which would be more likely to retain sperm and thereby increase the chances of fertilization, were positively and significantly correlated with increased symmetry in the man (Thornhill et al., 1995) suggest that women are adapted to desire good genes for their offspring.

Thus, it appears that both men and women are adapted to employ both short and long-term mating strategies depending on the environmental, personal and cultural contexts.

### **3.3.7. MUTUAL MATE CHOICE**

So far the above discussion suggests that one sex chooses whilst the other competes to be chosen. While this may be the case for some species it is not the

case for humans and in fact it is beginning to emerge that many other animals previously assumed not to engage in mutual mate choice do (Kraak & Bakker, 1998). The literature on human mate preferences clearly demonstrates that both men and women have strong mate preferences which they utilise in mate choice decisions. Nevertheless, in general mutual mate choice in humans tends to remain an assumption rather than being specifically highlighted.

Discussions of mutual mate choice tend to highlight the operational sex ratio as predicting which sex will be the predominant competitor for mates, even when mutual mate choice is evident. The operational sex ratio (OSR) is the ratio of males and females who are ready to mate in a population at a given time (Kvarnemo & Ahnesjö, 1996). Although parental investment is closely associated with the operational sex ratio, other factors, such as the adult sex ratio, and the distribution of the two sexes in time and place as well as environmental aspects such as abundance of food, also affect the OSR (Clutton-Brock & Parker, 1992).

It has been demonstrated that when the OSR is at equilibrium there is a predominance of assortative mating and thus mutual mate choice. With a slightly biased OSR the mating strategies are diverse but when the OSR is highly biased there tends to be the greatest divergence between the sexes so that one sex predominantly chooses while the other predominantly competes with the rarer sex generally being the choosier (Bessa-Gomas et al., 2003).



Nevertheless, Kokko & Johnstone (2002) found that mutual mate choice can occur when there are high biases in the OSR as long as there is high variation in quality for both sexes, that there is relatively low mortality during mate-searching, and that there are high costs to breeding for both sexes. In particular they emphasise the role of parental investment stating that mutual mate choice will occur when biparental care is essential for offspring survival (Kokko & Johnstone, 2002).

Johnstone et al (1996) found that when processing time (which closely equates to parental investment) is high, there were large variations in the quality of individuals, and the benefits of choice were high, mating is closely assortative (Johnstone et al., 1996). Thus, when both sexes have considerable processing times, as in biparental species, then mutual mate choice was predicted. However, costs of choice may lead to less than perfect assortative mating and so this may favour extra-pair copulations to gain good genes for the offspring (Johnstone et al., 1996).

Thus, the emergence of mutual mate choice is reliant on a number of factors including parental investment, OSR, variation in quality of individuals, mortality patterns, mate encounter rates, costs of choice, the spread in time and place of the two sexes, the adult sex ratio and environmental resources associated with reproductive success. However, while mutual mate choice does occur this does not mean that both sexes are equally choosy and the fact that women do demonstrate greater parental investment often means that sexual dimorphism in mating behaviour is evident in humans.

### **3.4. CREATIVE PRODUCTS AS FITNESS INDICATORS**

Various creative behaviours, including art, do not fit the adaptationist criteria for survival mechanisms which include low phenotypic and genotypic variance, and low heritability (Miller, 2000c). Therefore, it has been proposed that these behaviours may be products of mechanisms that evolved through sexual selection and as such act as fitness indicators to attract mates (Miller, 2000c). The function of fitness indicators is to advertise to others the qualities of the displaying individual with the aim of deterring a predator, intimidating a sexual rival or attracting a mate. Creative products should act as indicators of genetic and phenotypic quality and thus those that produce the highest quality creative products should gain the most or the highest quality sexual partners, thereby maximising their reproductive success.

#### **3.4.1. INDICATORS OF GOOD GENES**

Zahavi (1978) observed that decorative patterns on many animals served as indicators of their quality. He then extrapolated this theory to explain art as advertising the qualities of the artist in human societies. However, he was unsure why artists did not instead invest in “real assets” such as wealth and power to compete in society (Zahavi, 1978). Whilst these aspects are found to be valued by potential mates (Buss, 1988, Buss, 1989) they tend to be used for long-term rather than short-term mating, whereas artists without such assets have been found, in one study to be more successful in short-term mating when females have a higher risk of conception (Haselton & Miller, in press). This is a strategy that is particularly successful from a reproductive viewpoint for males who want

as many matings as possible to increase their numbers of offspring and females who are looking for “good genes” that demonstrate intelligence and creativity. Therefore, this study suggests that creative production is a short-term mating strategy. Further work however needs to be conducted since Haselton & Miller (in press) assume that sexual dimorphism is evident in the use of creative products as courtship displays. However, as Haselton & Miller (in press) acknowledge, Buss (1988) found that intelligence and creativity were valued equally by both males and females. Therefore there is no reason to assume that females would also not display creative products to attract a mate, particularly since humans exhibit mutual mate choice, although as discussed above females do appear to have more exacting standards and thereby desire these qualities at a higher level than males due to a female’s greater parental investment.

A study by Nettle and Clegg (in press-b) found that both professional and serious artists and poets were found to have had significantly more sexual partners than hobby and non-producers of art and poetry. This provides evidence for creative behaviour acting as a fitness indicator to attract mates. Interestingly, there was found to be no effect of sex on these results (Nettle & Clegg, in press-b). Thus, more professional female artists and poets were attracting more mates than those who were less professional and that they were doing this to the same extent as the males. This is an unexpected result from the perspective of sexual selection, which suggests sexual dimorphism in display due to differing levels of parental investment. A similar result was found in a study of student athletes where both male and female students who competed in sports were found to have significantly greater numbers of sexual partners than those of the same sex who

were not involved in competitive sport although there was a significant sex difference among those who competed in sport with males having significantly more sexual partners than females (Faurie et al., 2004).

Nevertheless, from these studies it is difficult to identify whether or not the creative product is actually acting as a fitness indicator. It is also possible that the particular behaviours of more professional artists may actually evoke a stereotypical image of an artist that in Western society is generally considered sexually attractive and so it is this image that is attracting more sexual partners rather than the art itself. One study provides some suggestion that this may be the case. Indeed, Etaugh & Sanders (1974) found that when artists were judged on aspects, such as technical competence and creativity, purely through assessments of their artwork the greater the status or success the raters believed the artists to have the higher they rated them on each of the criteria despite the status and success of the artists being randomly attributed by the researchers and rotated between participants (Etaugh & Sanders, 1974). However, there has been little consideration of the possible relationship between mating success and stereotypical images of the artist and so this requires further exploration.

A further point about many creative products is that often these products need to be assessed over a period of time. This does not argue against the sexual selection model but does suggest that they may also be used in long- as well as short-term matings since this would imply the building up of a relationship with the person, although of course it is quite possible to have a brief sexual liaison with someone well known to the person.

### **3.4.2. THE QUALITIES EXPRESSED**

In his 2001 paper Miller argues that art acts as a fitness indicator. The qualities of the artist that art is demonstrating are "...health, energy, endurance, hand-eye co-ordination, intelligence, creativity, access to rare materials, the ability to learn difficult skills, and lots of free time" (Miller, 2001) and these qualities are primarily indicated through the aesthetic quality of the artwork. Moreover, Miller also suggests that personality traits of the artist, such as neuroticism, extraversion, openness to experience, agreeableness and conscientiousness will also be expressed through the artwork and used in mate choice. Some of the qualities, such as access to rare materials, would have more relevance in the ancestral environment than the modern world since art materials are not difficult to access, at least in the West, and so do not demonstrate high problem solving abilities to gain such materials. Nevertheless, if artwork did evolve through sexual selection then the ability to assess these qualities should still be present.

Interestingly, possessing observable good health is not necessarily consistent with Zahavi's (1975) handicap principle. Whilst the imposed handicap does mean that only fitter individuals can survive the costs of the handicap the individual with the handicap will become less fit over time. However, the advantage is that having a good quality handicap ensures more matings and/or higher quality mates.

However, Miller (2000b) places particular emphasis on intelligence and he claims that creative behaviours may have evolved primarily to advertise

intelligence to prospective mates. Intelligence is believed to be important due to its relationship with fluctuating asymmetry, longevity and health as well as its relevance to parental ability (Miller, 2000b). In fact, intelligence has been found to be a highly valued mate preference for both males and females cross culturally (Botwin et al., 1997, Buss et al., 1990, Buss et al., 2001). Nevertheless, intelligence does not indicate willingness to provide and maintain resources or to be faithful, both of which are also particularly important for reproductive success, unlike personality traits. In fact, personality traits, particularly those that can be subsumed under agreeableness, are consistently given a high priority in mate preference studies (Botwin et al., 1997, Buss & Barnes, 1986, Goodwin, 1990). Therefore the ability to assess personality characteristics through fitness indicators, such as artwork, should also be important.

Nevertheless, the fact that sexual selection theory predicts that those with good quality fitness indicators will have the opportunity to engage in an increased number of sexual liaisons with different mates and/or gain higher quality mates conflicts with evidence from personality psychology when applied to creative individuals. There have been a number of studies on personality traits of creative individuals that indicate a number of asocial characteristics that are consistently found in both creative artists and scientists (Feist, 1999). These include introversion, independence, hostility and arrogance (Feist, 1999, Feist, 2001). Feist (2001) argues that such characteristics may lead to a lower, rather than higher, number of matings, and that creative individuals are less likely to marry and, if they do, tend to have fewer children. However, other personality traits, such as charm, self-confidence and emotional sensitivity are also found in

creative individuals (Feist, 1999; 2001) and these can be very attractive qualities to potential mates. Furthermore, people can be easily seduced by a stereotype of an individual. The stereotype of a creative individual is often linked to traits such as passion, risk-taking and imagination that whilst empirically found in many creative people tends to focus on the positive, exciting characteristics. Therefore, such a stereotype may provide more short-term matings even if the more asocial characteristic tends to reduce long-term mating opportunities.

When establishing an argument, examples of creative people are often used to advance the point being made. Simonton (1999) when suggesting that creative genius may detract from reproductive fitness cites Michelangelo, Newton, Descartes and Beethoven as examples of geniuses that died apparently childless. There are however problems with this somewhat anecdotal approach. It is of course possible that these individuals either did leave progeny that are unknown or that they were infertile or homosexual, numbers of sexual liaisons does not necessarily correlate with numbers of offspring. Also, it may be that these individuals did have asocial personality traits that made them unattractive. However, counter examples can always be found. For example, the mathematician John Nash, was not only diagnosed with schizophrenia, but appears to have had a number of antisocial characteristics (Nasar, 1998). However, he managed to not only marry but also to have two children from different women. Other creative individuals, such as Augustus John and Picasso had large numbers of sexual liaisons. Therefore, using examples as evidence are problematic.

### **3.4.3. PRODUCTION THROUGH THE LIFESPAN**

If creative products do act as fitness indicators then there should be evidence of differing production across the creator's lifespan. Miller (1999:81) states "...cultural production should increase rapidly after puberty, peak at young adulthood when sexual competition is greatest, and gradually decline over adult life as parenting eclipses courtship". He then goes on to demonstrate this by looking at jazz albums, modern paintings and books and identifying the age of the creators when they produced these creative works. From this he found that there was a peak at young adulthood. However, this does not indicate that these creative individuals are producing their greatest numbers of work, rather that there is a peak at that age when works were socially recognised and valued.

Kanazawa (2000) considered scientific discoveries as creative courtship displays. However, he considered that the scientists' most significant discovery as defined by "The Bibliographical Dictionary of Scientists" denoted the peak of the scientists' career (Kanazawa, 2000), which again is not necessarily the time of greatest output. Kanazawa's (2000) results supports those of Miller's by demonstrating sexual dimorphism and a similar age profile for peak scientific achievement of male scientists. Moreover, he considered the difference between married and never married scientists and found that the age profile only held for scientists who had been married at some point. This, he suggests, strongly supports Miller's hypothesis that parenting eclipses production. However, he does not look at peak scientific achievement and time of first child born which would be a more accurate test of the hypothesis.



The fact that creative output declines once the man has married, in Kanazawa's (2000) sample, due apparently to parenting does not necessarily fit with the findings that men are more inclined towards short-term matings, including extra-marital affairs, as discussed above. Also, if parenting commitments reduce creative production then it is surprising that there is not a peak later in life when the children have become more independent, although one possible answer to this is that by this time they may be investing in grandchildren. Finally, since presumably the production of creative products is a primary source of income for many, then why would the production decrease when resources such as money would be of considerable importance with the arrival of offspring? Although it could be argued that creative products are costly to produce, the fact that the creators have invested so much already in them and the costs of establishing themselves in another career would suggest that they would continue to produce these products.

#### **3.4.4. SEXUAL DIMORPHISM**

Sexual selection may lead to sexual dimorphism (Mace, 1992) and this does appear to be the case in humans to some extent despite mutual mate choice as discussed above. Thus, certain psychological traits in humans, whilst not considered to be different in ability, are thought by some to show a difference in expression within males and females. Miller (1999) proposes that the public display of creative products is greater in males than females because of different sexual strategies, for example they are used by males to act as indicators of quality for short-term mating strategy. Females on the other hand are more likely to use their creative abilities once they have successfully mated to ensure

continued attention and investment from their partner (Miller, 1999). Nevertheless, the findings from Nettle & Clegg (in press-b) demonstrating no significant differences in mating success between female and male professional and serious artists suggests that females may be equally displaying their artistic products to males once they have high artistic status, although further investigation is required to confirm or refute this hypothesis. However, it can also be easily argued that the reduction of creative product production is a consequence of sexual inequality within society. Miller disagrees with this by stating that the same pattern is observed in bird song production. However, bird song and creativity in *Homo sapiens* have two separate evolutionary origins and are psychologically very different.

Miller (1999) and Kanazawa (2000) find evidence of sexual dimorphism in their samples, with Miller finding that males produced approximately ten times more than females across all tested media. However, strong cultural and social expectations of gender role and stereotypes may play an important part in these interpretations. Therefore, more research, particularly cross-culturally, needs to be done within this area. In the meantime, sexual dimorphism for level of creative production cannot be assumed.

### **3.5. CONCLUSION**

The theory of sexual selection to explain the emergence of creative products such as art can be intuitively appealing. However, this does not mean that it should be assumed to be correct. Creative products encompass a wide variety of very different artefacts. Whilst some of these may have evolved through sexual

selection others may have evolved through natural selection or be by-products of other adaptive cognitive abilities.

Whilst there has been a reasonable amount written on creative products being sexually selected and acting as fitness indicators (as described above) only a handful of authors have attempted to test this hypothesis (Kanazawa, 2000, Miller, 1999, Sluming & Manning, 2000). Much more empirical data needs to be accumulated before sexual selection can be advanced as the mechanism by which creativity evolved in humans.

Nevertheless, sexual selection currently remains the strongest contender to explain the evolution of human creativity. The second and third studies in this thesis aim to test some of the predictions made by Miller (2001), mainly whether artworks act as fitness indicators and are used in mate choice decisions (Chapter 7) and whether more professional artists have greater reproductive success (Chapter 10). To begin to attempt to understand whether visual art is a product of sexual selection is of fundamental importance to furthering the field of evolutionary psychology.

However, before this can be done the term creativity needs to be operationalised and the most commonly considered activities under the umbrella of creativity identified. This will be the aim of the first study.

## **CHAPTER 4.**

### **DEFINITIONS OF CREATIVITY STUDY**

#### **4.1. INTRODUCTION**

It is clear that despite considerable research in the area there continues to be a lack of consensus as to a definition of creativity. In the meantime, evolutionary psychology is beginning to develop theories for the emergence of creativity but has on the whole failed to consider its definition. Miller (2000a), when arguing that creativity evolved due to sexual selection pressures, appears reluctant to specify a definition although does state, "...creativity implies the generation of novel, unpredictable, non-deterministic behaviour". This is in line with definitions of creativity from psychology (Feist, 2001) but presents the problem for evolutionary psychology that this could apply to so many activities that it is extremely difficult to provide an all encompassing evolutionary explanation for such a range of behaviours. Miller (2000a) does tend to focus on the arts, such as dance, painting and story telling, and whilst acknowledging that science is creative appears to claim that it is an intellectual and status display as opposed to displaying "...physical attractiveness, health, kindness, or other fitness indicators" as he postulates other creative activities do (Miller, 2000a). However, this does not preclude scientific creativity from being sexually selected for and in fact Miller (2000a) states that it is one of the most advanced types of human courtship display. However, he also considers art to be primarily a display of intelligence (Miller, 2000b) and so Miller's distinction between the arts and science is unclear.

Even when creative behaviour is reduced to one specific activity, such as art, there continue to be problems with definitions of the term. Lewis-Williams (2002), when discussing definitions, highlights the dangers in even using the term “art” with its many modern Western connotations and also the influence that the times in which the researcher lives has on the interpretation of ancient artefacts and hominid behaviour. In fact, he prefers to consider the evolution of artists as opposed to art (Lewis-Williams, 2002). However, this does not solve the problem of definition since it is then necessary to define the term “artist”.

Dissanayake (1995) defines art as “making special” (see Chapter 3). However, her definition could include such a vast number of behaviours that the term becomes meaningless. Dissanayake recognises this difficulty and so narrows it to focus on the behaviours observed in human ritual ceremonies. However, since the types of behaviours these encompass are typically grouped under the heading “The Arts” it appears that Dissanayake’s is no further on in defining the term art.

Defining creativity is vital to the validity of the research. However, different people are likely to define creativity differently. Thus, before embarking on an exploration of the relevance of the sexual selection model to creativity it is necessary to identify people’s definitions of creativity and attempt to determine what factors influence their interpretation of the term. Moreover, an implicit definition is particularly relevant since sexual selection is applicable to all humans and so a common understanding of what is creative is required to identify which products are creative and can therefore be subject to sexual selection.

Moreover, the current literature tends to focus on eminent creativity rather than everyday creativity. Sexual selection assumes a continuum of creative ability since observers of creative products are believed to be able to distinguish between different abilities and thereby choose those individuals who demonstrate the highest qualities through their products. As a result it is necessary to have a measure of creativity that is based on a continuum.

Thus, the aims of this study are:

- To investigate implicit definitions of creativity.
- To identify which creative activity is most closely associated with creativity so that it can be used to test the sexual selection hypothesis.
- To develop a creativity continuum measure.

## **4.2. METHOD**

A self-completion questionnaire was developed to identify people's definitions of creativity. This type of measuring instrument was chosen for a number of reasons. Firstly, to develop a continuum of self-rated creative ability and to determine whether there was a relationship between this and an individual's definition of creativity a large sample size was required. Therefore, the questionnaire was placed online since Internet questionnaires have been found to produce a greater number of responses (Buchanan & Smith, 1999, Mathy et al., 2003). Also, since there was to be no contact with the researcher social desirability bias should have been reduced and participants may have felt more assured of anonymity and confidentiality, which may have increased the likelihood of them participating.

However, with questionnaires there is also a higher probability of more spoilt questionnaires and an unidentifiable number of wrong responses due to participants misunderstanding the question or not reading the question properly. Therefore, questions were carefully scrutinised to reduce ambiguities and avoid jargon or confusing terms. Also, the questionnaire was piloted to attempt to identify any problems with understanding (see below for a more detailed description).

The questions primarily required tick box responses and so analysis was mainly quantitative in approach. Whilst it could be argued that this reduces the richness of possible responses it provides the opportunity to identify statistical relationships between variables thus providing an overview that can be generalised to a wider population. Furthermore, since the questionnaire covers a number of aspects of creativity, to use open-ended questions would have made the questionnaire much longer thus risking a greater refusal rate and more spoilt questionnaires.

The questionnaire was initially developed from the academic literature on creativity. Aspects of the product, person, process and environment approaches were collated and questions based on current theories of creativity formulated by psychologists. However, to make sure that the options provided under each question would reflect implicit theories of creativity rather than just explicit theories an initial small-scale study was conducted. This small-scale survey aimed to ensure that the questionnaire was relevant to the participants, who would be from a general population, and would therefore reflect their opinions

and thus provide a valid exploration of the understandings of creativity from a general population's viewpoint.

#### **4.2.1. The Small-Scale Survey**

The sample in this study consisted of three male and six female postgraduate students from a variety of departments. The majority were from a white Western background and since the academic literature also predominantly comes from Western scholars the questionnaire will only be applicable to a Western perspective. The participants completed the questionnaire (Appendix 1) one at a time in a room with the researcher present

Interestingly, while students from The Arts were not represented, when asked to give examples of creative areas there was a strong bias towards The Arts (47%) with other areas being cited including technology and design (23%), business (10%) and science (10%). This suggests that the term creativity may have a stronger association with arts rather than science themes. However, when the participants were asked whether they were creative the responses they gave were more evenly spread out over the arts (33%), research (27%), domestic (20%), technology/design (13%) and problem solving (7%).

In general the responses reflected the findings from explicit theories of creativity. For question 1 (words used to describe the term creative) the participants' influences emerged in their defining of the term with art and technology/design type words, such as artistic and constructive, being evident as well as there being



a lack of words that were clearly influenced by science. Furthermore, words such as original and innovative arose a number of times (Appendix 2).

When asked which people decide whether a product is creative a broad response (Appendix 2) was given. Interestingly two participants stated that no one decided. The fact that the product exists or is new is enough to label it as creative. This is a perspective that is generally not considered or supported in the Western academic literature.

The most commonly used words in the survey to describe what makes a product creative can be grouped under the terms original, novel and new (Appendix 2). These are also frequently used in the academic literature to define a creative product. Aspects of the creator, the effect on the observer, and usefulness of the product were also mentioned.

Finally, the personality traits that participants felt were common in creative individuals were a mixture of those found in empirical studies, such as non-conforming, open-minded, and persistent, and a somewhat stereotyped version of creative individuals, for example wild and dreamer (Appendix 2).

Thus, in general the results from this small-scale survey reflected the findings in the academic literature on creativity. The data from this study as well as findings from empirical studies were combined to produce the questions in the final questionnaire. This study therefore helped to inform the design of the questionnaire.

#### **4.2.2. Pilot study**

The questionnaire (Appendix 3) was piloted to identify any problems in its design. In general the revisions from the pilot study were around the wording and layout of the questions (see Appendices 3 and 4 for comparisons). Certain questions that might bias responses to other questions, such as the interests question (question 16, Appendix 4) were placed nearer the end of the questionnaire and some more science/technology activities added. The most major change was that questions 11, 12 and 13 were collated and turned into statements to be rated on a scale from “very true” to “very untrue” (see Appendix 4). This was to enable the participants to respond to the questions more easily. It also provided the basis for the development of a continuum of self-rated creative ability.

#### **4.2.3. The Final Questionnaire**

Questions 1 to 8 (Appendix 4) provide relevant demographic information on the sample. Question 9 is more open-ended. It directly asks about an individual’s definitions of creativity although it confines responses to five words for ease of analysis. Being open-ended, question 9 provides a direct, more personal account of individual definitions of creativity and allows for responses that may not have been considered by the researcher. This question is placed before the other definition questions to help prevent the participants being influenced in their responses by the rest of the questionnaire.

Question 10 attempts to clarify the general perception of the activities implied under the umbrella of creativity. If the same activities frequently emerge then the use of the word creative without definition in the evolutionary psychology literature may be defensible. However, even the use of such a broad term requires an explicit statement of the activities it incorporates to allow testing of the hypotheses for its emergence. Thus, the findings from this question will help to determine the activity to be considered in the remaining studies within this thesis when testing the sexual selection hypothesis of creativity.

The scale in question 11 placed participants on a self-rated continuum of creative ability. The discussion in Chapter 2 suggests that there is a continuum of creative ability despite considerable research focusing solely on eminent creators. This questionnaire recognises the possibility of a continuum and attempts to test this hypothesis. It also considers creativity from a variety of areas and from the perspective of others as well as the participant in an attempt to consider creative ability broadly.

Question 12 considered the creative product. It was developed using the responses from the small-scale survey and the items in the revised Creative Product Semantic Scale (O'Quin & Besemer, 1989). The goal of question 12 was to identify people's interpretations of what identifies a product as creative. Participants were requested to choose only five in an attempt to determine the most important features.

Question 13 focused on the judges of creative products. From the point of view of the sexual selection hypothesis “the people who use/view the product” would be the most important in identifying a product as creative. However, those groups, such as the media, that have the ability to publicise their opinions will also be important if they influence public opinion as to a product’s creative worth. Moreover, the academic literature often focuses on the creators and experts as appropriate judges (Chapter 2).

Question 14, considering personality, was a combination of responses from the small-scale survey and the academic literature. The traits came from studies of both artists and scientists and so it may be found that responses are split on this variable. Many of the adjectives were taken from a meta-analytic study which represents commonly used descriptions of creative individuals from a large body of literature. The word sensual was also included, although not generally found in the psychology literature in relation to highly creative individuals. This question is of particular relevance to the sexual selection theory of creativity, which proposes that potential mates will consider the highly creative individual as possessing positive traits, such as intelligence, that they wish to be passed on to their offspring and therefore may find these individuals more sexually attractive.

In question 14 the traits lacking in confidence, warm, and closed-minded are the opposite of what is expected to be found in highly creative individuals and were placed in the question to try and prevent response bias. Usually more options are reversed in such a scale. However, the wording of each trait is important and for

many dimensions the obvious opposite term did not quite have the opposite meaning. Furthermore, certain traits that appear opposed, such as introverted and extraverted, are both found to exist more often in highly creative individuals (Feist, 1998) and so were both present in the list.

Question 15 reflects the four predominant approaches to creativity in the academic literature; the person, the product, the environment, and the process. The sexual selection model predicts that it is the product and the personality traits of the creator that are of fundamental importance with little consideration of the environment and process.

Questions 16 identified the degree of involvement in creative activities and therefore whether degree of actual creative activity influences definitions of creativity. This question may also help to validate the creativity continuum since it is hypothesised that those engaging in more creative activities will have a higher score on the creativity continuum.

Question 18 was a reduced version of the Openness to Experience measure from the Five Factor Model (Buchanan, 2001). The Openness To Experience Questionnaire has been found to be positively correlated with creativity as measured by the Creativity Personality Scale and may be used as a tool for identifying potentially creative individuals (McCrae, 1987) (see Chapter 2). Thus, scores on this scale can be compared to scores on the self-rated creative ability continuum to identify whether there is a positive correlation between the two scales, which would aid in the validation of the creativity continuum.

To further prevent bias, three science related questions were added to question 18. These were “Do not like to learn about science”, “Like making things with my hands”, and “Do not enjoy going to museums of science and technology”. The responses to these questions will not be considered when scoring for openness to experience.

Since the literature on the areas covered by the questionnaire is inconclusive no predictions or hypotheses will be generated for this study.

#### **4.2.4. Presentation of the Questionnaire**

Prior to the questionnaire being put online approval was gained from the University’s ethics committee.

The questionnaire was placed on the ELSA web server (<http://elsa.open.ac.uk/survey.asp?id=0I3108> ) and advertised on a conferencing system (see below for further information). However, whilst there are advantages to using online questionnaires, as discussed earlier, there are also disadvantages that need to be considered.

One problem is that only those with access to the internet can participate in the study which may mean that the sample consists of predominantly white, educated, middle-class males (Hewson, 2003). Nevertheless, Internet access is becoming increasingly available for all sections of the community, especially with the rise in Internet cafes and libraries that have computers available for

public use. Moreover, while considering all the potential biases inherent in online questionnaires Hewson (2003) concludes that they "...may help obtain more "representative" samples than has been practicable, or typical, in much traditional psychological research" and this opinion is also supported by researchers such as Buchanan & Smith (1999).

Nevertheless, another potential for bias in an Internet based survey is the types of people attracted to participate in this type of research. When Marcus & Schutz (2005) looked at types of non-respondents, to an online study, they found that compared to those who refused to participate (complete non-respondents) respondents were significantly more agreeable and more open to experience (ratings were done by observers who rated the person's personality traits from their personal websites). Furthermore, careless item omission demonstrated small significant correlations with low self-reported openness and selective item omission of demographic data was significantly correlated with low observer ratings of extraversion (Marcus & Schutz, 2005). A study by Dollinger & Leong (1993) confirmed these findings. They found that those people willing for their standardised test scores to be released and those prepared to be followed up in longitudinal research were significantly higher in agreeableness and openness than those who did not. Also, those who agreed to engage in longitudinal research were also higher in extraversion than those who declined to participate (Dollinger & Leong, 1993). However, Mathy et al (2003) state that overall there does not appear to be a strong association between preferences for Internet usage and global personality dimensions, and therefore the personality types likely to respond to Internet surveys.

A further problem for online research is the lack of control that the researcher has over the completion of the questionnaire. It is not possible, for example, for the researcher to know whether participants are completing the questionnaire more than once in different ways or that they accidentally press the submit button more than once. However, the questionnaire was approximately 30 minutes in length and there was no opportunity for feedback from their responses, which may deter individuals from deliberately submitting multiple responses. Furthermore, the ELSA system automatically deletes multiple submissions from the same IP address, although this may remove two responses from two different participants using the same computer. However, it was felt that the former was likely to be a greater problem than the latter.

However, despite the above concerns, research has found that for online studies samples are likely to be more representative than traditional psychology research using undergraduate psychology students (Hewson, 2003) and in fact responses may be more honest and accurate. Furthermore, a summary of the current research found that the reliability of Internet based research is similar to that of other methods such as mail based surveys (Mathy et al., 2003). Thus an online questionnaire was felt to be the most appropriate to the requirements of this study.

#### **4.3. THE SAMPLE**

To be able to achieve a large enough sample of people representing the general population within the resources available it was decided to sample a student



population that used an online conferencing system. Sampling a student population immediately creates a bias since the types of people who become students, and their levels of education are not likely to be representative of the general population. However, the university from where the participants came from consisted of a much more diverse subsection of the population than found in other universities due to its accessibility to those without formal higher-level qualifications. Furthermore, since there is an emphasis on distance learning the population of students is much larger than other universities and will comprise a larger age range and cover a wider geographical area.

The conferencing system allows access to a large range of students while being efficient in terms of cost and time. Moderators of the conferences were contacted and an introduction and link to the questionnaire was placed on the conferences where permission was granted. These conferences included chat rooms for those involved or who have an interest in social sciences, technology, arts, business, science, needlework, education, drama, comedy, writing, DIY, gardening, reading, and a general chat room available to all students. However, despite attempting to gain participants from a broad range of fields some areas such as maths and computing, language studies, and health and social welfare either did not appear to have conferences running, the moderators did not give permission or respond to the request, or the conferences were very out of date or inaccessible. The study was run for two and a half months.

## **CHAPTER 5.**

### **DATA ANALYSIS OF DEFINITION OF CREATIVITY STUDY**

#### **5.1. DEMOGRAPHICS**

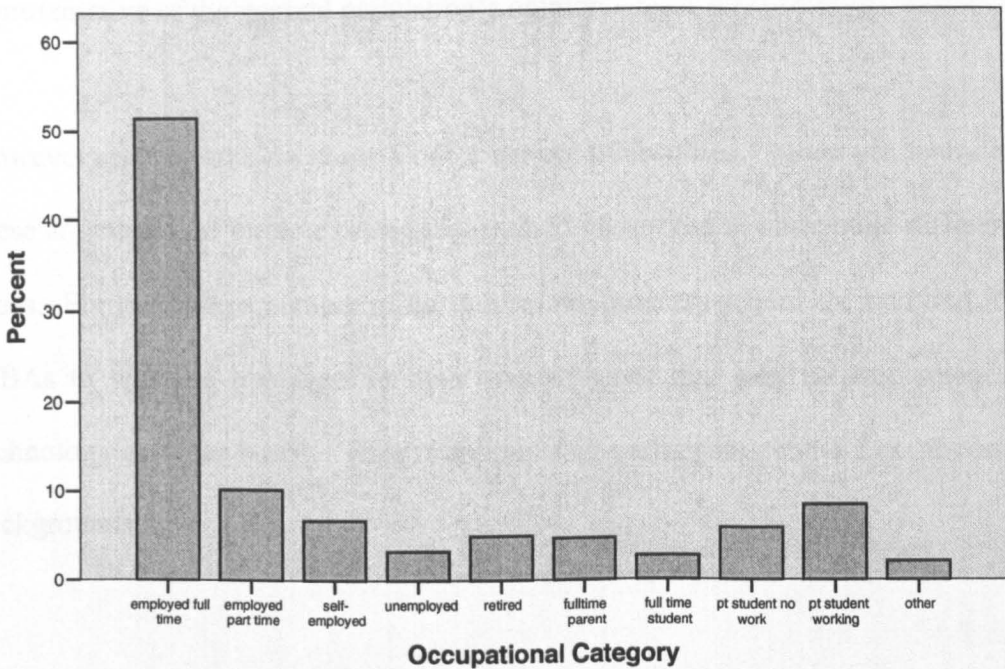
The total number of participants was 344. The majority (66%) were students with the remaining 34% being a mixture of academics, managers and other staff associated with the university. Approximately one third of the sample was male (34.6%) and two thirds female (65.4%).

The ages showed an approximately normal distribution (mean = 40.4, SD = 9.894, range = 52). Whilst this would not be expected for a normal university student population the university employed in this study attracts a more diverse student population.

As was expected, the majority of participants came from a Western background although in total five categories were identified from the ethnic origins question; Western (93.3%), Asian (2.3%), Afro Caribbean (0.6%), Mixed (2.0%), and other (1.8%). Therefore, this research is only generalisable to a Western population.

For the question referring to occupational status (Fig 1) the majority (51.5%) stated that they were working full time. However, it emerged that many of those stating that they were full time employed were also students. This is likely to be due to the part-time nature of the courses offered.

**Fig. 1. Percentage of Participants within each Occupational Category**



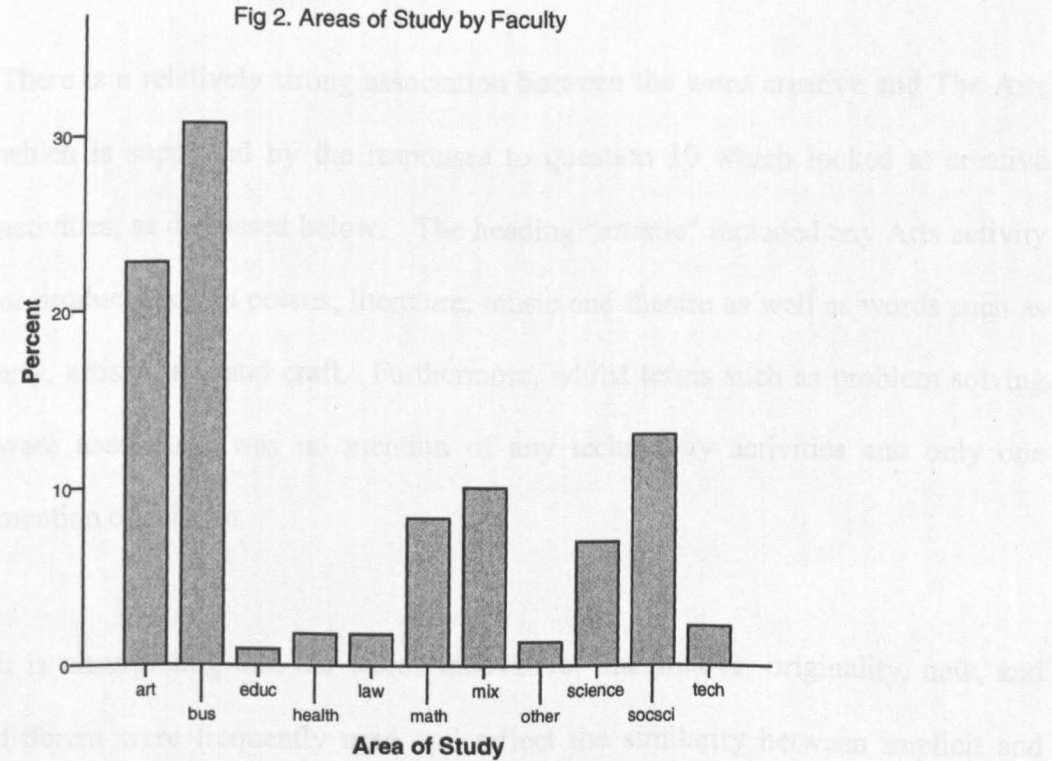
A wide range of different careers was covered within the sample. However, it is difficult to categorise them into areas such as science, arts, and technology, since there was often not enough information available to make an accurate judgement. Therefore, to gain some idea as to the areas that may influence participants' understandings of creativity the areas of study were identified by categorising them into university faculties.

Students from the Arts and Business faculties predominated with each making up 22.8% and 30.7% respectively of those that were studying (Fig 2). The unevenness in the distribution of areas of study may create biases in the responses. For example, the low numbers of students from technology and science and the higher number of arts students may create a bias towards The Arts and away from science and technology although those from the business

school should reduce this bias. However, those from the Business School may view successful creative products as those that are marketable, which may not be representative of the general population's opinion.

However, participants do come from a variety of faculties. Moreover many of these are employed or have previously studied or worked in other quite different areas. Furthermore, a number of those from the business school are studying for MBAs to work as managers in their area of work that may be arts, science, technology or other based. Thus it appears that participants come from diverse backgrounds.

Originality	93	4.4%
Nov	69	4.0%
Different	69	4.0%
Problem Solving	57	3.3%



## 5.2. DEFINING CREATIVITY

Question 9 asked participants to list a maximum of five words that they would use to describe the word creative. This generated a large number of words that were grouped under broader headings where there appeared to be a common theme. Table 1 shows the most frequently used headings.

**Table 1. Most Commonly Used Words To Describe The Term Creative.**

Words	Frequency	Percentage
Artistic	143	8.3%
Innovative	137	8.0%
Imaginative	113	6.6%
Thoughts/Ideas	104	6.1%
Originality	98	5.7%
New	69	4.0%
Different	69	4.0%
Producing/Making	57	3.3%

N= 1720

There is a relatively strong association between the word creative and The Arts which is supported by the responses to question 10 which looked at creative activities, as discussed below. The heading “artistic” included any Arts activity or product such as poems, literature, music and theatre as well as words such as arty, artisan, art, and craft. Furthermore, whilst terms such as problem solving were used there was no mention of any technology activities and only one mention of science.

It is unsurprising that the words innovative, imaginative, originality, new, and different were frequently used and reflect the similarity between implicit and explicit theories of creativity. This corresponds to the first part of Feist’s definition that “...creativity involves bringing something into being that is novel (original, unexpected)...” (Feist, 2001). However, Feist’s second part that it is

“...adaptive (appropriate, useful, correct and valuable)” is less strongly supported although terms such as practical and useful were present in 1.7% of responses.

Thoughts/ideas included words such as thinker, thought-provoking, thoughtful, idea generation, lateral thinker, intellectual freedom, and analyse. This suggests an emphasis on the mental process that is reflected in the responses to question 15 (see below). This may be a product of the sample since the majority of participants are either students or lecturers and so may value the intellectual more than a truly general population.

The terms producing/ making focused on the creative product and included such words as productive, making things, produce, doing, creation of something positive, and result. The fact that these words were less frequently cited than words linked to the creative process was unexpected since according to the academic literature a Western population will emphasise the product over the other approaches to creativity (the process, the environment and the person).

Other headings that were more commonly used included expressive/communicative (2.9%), inspired (2.5%), skill (2.3%), building/constructing (1.9%), aesthetic (1.9%), enjoy (1.8%).

Thus, although it is difficult to come up with an overall definition of the term creative due to the diversity of responses, a tentative definition from this sample

is that creativity suggests innovative, original, and imaginative thought processes that may lead to an end product, which is primarily arts based.

### **5.3. CREATIVE ACTIVITIES**

Question 10 asked participants to list a maximum of ten activities that they considered to be creative. From assumptions made in the academic literature and observations of the use of the term creative, the hypothesis was that arts activities would predominate. The listed activities were categorised into one of five groups, art, science and technology, crafts and homemaking, intellectual, and other. Art included crafts as it was decided that crafts often mean art based activities such as glass painting, card making, and cross stitch. Whilst this may appear confusing since there is a separate crafts and homemaking category, this later group included activities that had a more functional use such as sewing and knitting. The crafts and homemaking category also included cooking, parenting, gardening, interior design, and DIY. The science and technology category included science research, maths, engineering, website design, and computer programming.

Some of the responses were more cerebral in nature. These included thinking, brainstorming, problem solving and inventing and so were placed under intellectual. The final category, other, included activities that could not easily be placed in any of the other categories and that did not appear to form separate groupings. These included teaching, unspecified design, conversation, sporting activities, studying/learning, and humour.

For the first five options the arts activities were more frequently cited than any of the others with 63% of the activities being arts based for the first option. For options six through to ten the other and missing/blank categories became the most popular. However, the arts continued to dominate the remaining 3 categories. Table 2 shows the percentages and frequencies for each category over all ten options.

**Table 2. Frequencies and Percentages of Creative Activities Identified By Respondents.**

	Art	Science/Tech	Craft/Home	Intellect	Other	Blank
Overall Frequencies	1127	89	367	193	857	727
Overall Percentage	33%	3%	11%	6%	25%	22%

N=3440

Here it can be observed that the arts category predominated which supports the above prediction. In fact the other three specified categories, science and technology, crafts and homemaking, and intellectual, have frequencies much smaller than the arts group. Interestingly, science and technology activities made up a very small percentage of the overall responses. Furthermore, only 71 participants (21%) put down one or more science or technology activities (Tables 3 & 5) whereas 93% included one or more arts activities (Table 4 & 5).

Moreover, both the science and technology students put down less science/technology activities than the arts and business students (Table 6). This is surprising and suggests that science and technology students may either just not consider their subjects as creative or that they are more traditional in their definition of creativity. A chi-squared test could not be conducted to identify



whether there was a significant relationship between the different faculties and frequency of including a science/technology activity because 24 cells had an expected count of less than 5. Furthermore, although it may be hypothesised that males are more likely to put down science/technology activities than females there was no significant relationship between the sex of the participant and the number of times a science/technology activity was included ( $\chi^2 = 1.648$ ,  $df = 2$ ,  $p = 0.439$ ) (Table 7)

**Table 3. Number of Times Participants Included Science & Technology Activities When Considering Creative Activities**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid .00	273	79.4	79.4	79.4
1.00	55	16.0	16.0	95.3
2.00	14	4.1	4.1	99.4
3.00	2	.6	.6	100.0
Total	344	100.0	100.0	

**Table 4 . Number of Times Participants Included Art Activities When Considering Creative Activities**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid .00	23	6.7	6.7	6.7
1.00	31	9.0	9.0	15.7
2.00	76	22.1	22.1	37.8
3.00	69	20.1	20.1	57.8
4.00	55	16.0	16.0	73.8
5.00	46	13.4	13.4	87.2
6.00	26	7.6	7.6	94.8
7.00	15	4.4	4.4	99.1
8.00	2	.6	.6	99.7
10.00	1	.3	.3	100.0
Total	344	100.0	100.0	

**Table 5. Percentage of Participants who Included One or More Responses in the Following Categories.**

	Art	Science/Tech	Craft/Home	Intellect	Other
Percentage	93%	21%	55%	38%	81%

**Table 6. Frequencies of Science and Technology Activities That Were Identified by Respondents in Different Faculties as Creative**

			Number of Science/Technology Activities Identified As Creative				Total
			.00	1.00	2.00	3.00	
Faculty	art	Count	42	7	2	1	52
		% within no. of sci/tech activities	80.8%	13.5%	3.8%	1.9%	100.0%
	bus	Count	52	16	2	0	70
		% within no. of sci/tech activities	74.3%	22.9%	2.9%	.0%	100.0%
	math	Count	12	4	3	0	19
		% within no. of sci/tech activities	63.2%	21.1%	15.8%	.0%	100.0%
	sci	Count	14	2	0	0	16
		% within no. of sci/tech activities	87.5%	12.5%	.0%	.0%	100.0%
	socsci	Count	26	3	1	0	30
		% within no. of sci/tech activities	86.7%	10.0%	3.3%	.0%	100.0%
	tech	Count	4	1	0	0	5
		% within no. of sci/tech activities	80.0%	20.0%	.0%	.0%	100.0%
Total	Count	178	39	9	2	228	
	% within no. of sci/tech activities	78.1%	17.1%	3.9%	.9%	100.0%	

**Table 7. Number of Times A Participant Considered Science/Technology Activities as Creative According to Their Sex**

			Number of Science/Technology Activites Identified As Creative				Total
			.00	1.00	2.00	3.00	
Sex of Participants	Male	Count	90	23	6	0	119
		% within sex	75.6%	19.3%	5.0%	.0%	100.0%
	Fem ale	Count	183	32	8	2	225
		% within sex	81.3%	14.2%	3.6%	.9%	100.0%
Total		Count	273	55	14	2	344
		% within sex	79.4%	16.0%	4.1%	.6%	100.0%

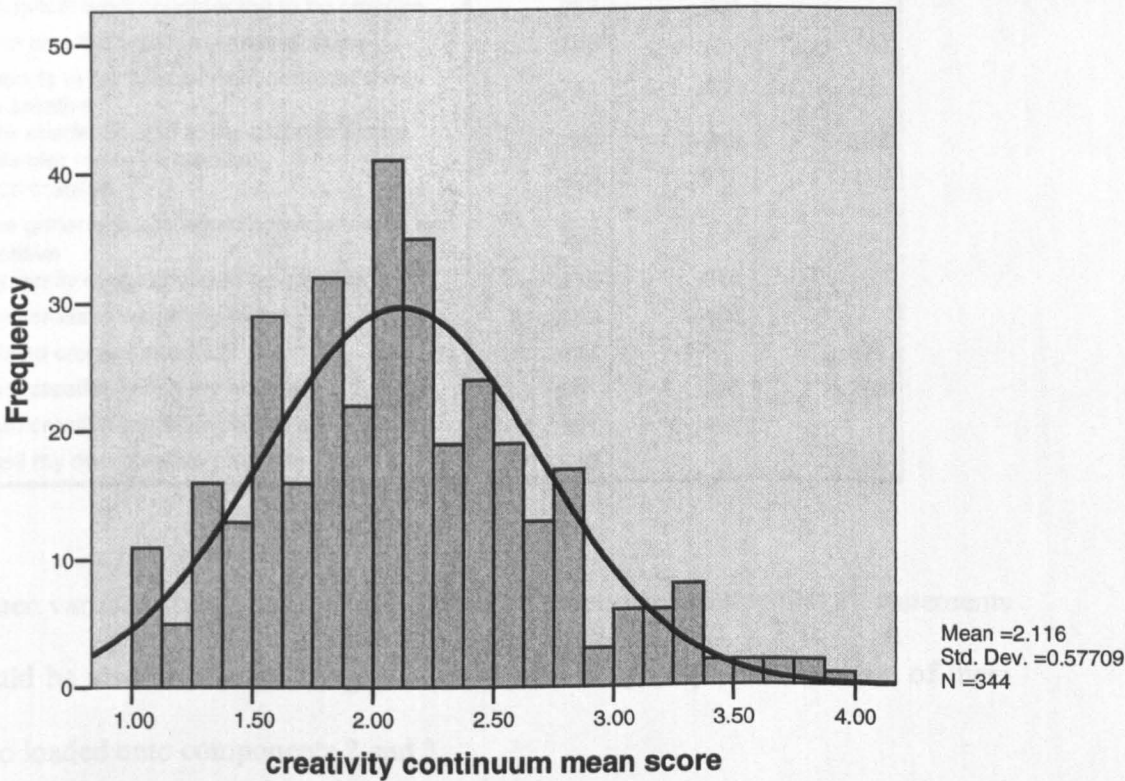
The questionnaire was carefully constructed to attempt to avoid influencing participants' responses to question 10. Thus, these findings should not be a product of bias in the questionnaire. Furthermore, the participants were aware that the questionnaire was looking at creativity. Thus, despite having an opportunity to reflect on what creativity is, the majority of participants continued to hold a fairly traditional perspective on the subject. Therefore, for this sample, there was a common assumption that arts products are implied when discussing creativity.

#### **5.4. THE CREATIVITY CONTINUUM**

Question 11 asked participants to rate how they and others perceived their creative ability and production. The aim of this question was to develop a creativity continuum that all members of the population could be placed along rather than dividing people's self-rated creative ability into one of two extremes, eminent or everyday creativity, as is often done in the academic literature (Chapter 2). This continuum was scored so that the lower the score the more creative the individual. Since there were a large number of missing values the means of the participants' scores were computed rather than the total score for each participant.

The distribution of scores was found to approximate a normal distribution (Fig 3). This supports the prediction that self-rated creative ability is normally distributed within the population rather than it being a trait that is either present to a large degree, as in eminently creative individuals, or in minimal quantities necessary for everyday creativity.

**Fig. 3. Distribution of Participants' Creativity Continuum Mean Scores**



Since this is a new scale, a principal components analysis was conducted to identify whether the questions were all measuring the same phenomenon. Ideally to be a valid scale it needs to achieve unidimensionality.

The principal components analysis identified 3 factors that explained the majority of the variance (66%). Of these the first component explained most of the variance (48%). As can be seen in Table 8 all the statements in the question loaded strongly on the first component. This suggests that all statements are measuring the same construct and provides evidence of unidimensionality.

**Table 8. Component Matrix(a)**

	Component		
	1	2	3
My friends consider me to be creative	.834		
People at work consider me to be creative	.757	-.331	
I am creative within my area of study	.746		
Experts in my area of work consider me to be creative	.741	-.439	
The academic staff at my place of study consider me to be creative	.729	-.249	-.208
I am creative	.719		
The general public would consider me to be creative	.702		
My family consider me to be creative	.678	.365	
I am creative within my work	.653	-.468	
I make creative products	.644		.571
I am creative within my hobbies	.601	.495	-.266
I am creative within my family life	.581	.497	
I sell my own creative products	.549		.725

When varimax rotation was applied (Table 9) it showed that whilst all statements could be said to be measuring the same construct (component 1) some of them also loaded onto components 2 and 3.

**Table 9. Rotated Component Matrix(a)**

	Component		
	1	2	3
Experts in my area of work consider me to be creative	.807		.286
People at work consider me to be creative	.787	.257	
I am creative within my work	.781		
The academic staff at my place of study consider me to be creative	.727	.323	
My friends consider me to be creative	.598	.585	
I am creative within my area of study	.578	.419	.231
I am creative	.516	.486	
I am creative within my hobbies		.809	
I am creative within my family life		.709	.278
My family consider me to be creative	.244	.695	.229
The general public would consider me to be creative	.398	.616	
I sell my own creative products			.878
I make creative product	.264	.285	.774

Thus, factor 1 could be assumed to be measuring self-rated creative ability. Factor 2 appears to be associated with creativity within the home. Furthermore, those items that scored negatively on this factor are associated with being creative at work (Table 8).

The two statements that scored strongly on the 3<sup>rd</sup> component were “I make creative products” and “I sell my own creative products”. This suggests that this third factor is about concrete products that are marketable rather than more abstract products such as ideas.

Interestingly, a significant, positive correlation was found between factor 1 and the overall creativity continuum mean scores ( $r = 0.651$ ,  $p < 0.01$ ). Correlations were also computed for factor 2 and factor 3 with the creativity continuum mean score, ( $r = 0.615$ ,  $p < 0.01$ ) and ( $r = 0.445$ ,  $p < 0.01$ ) respectively. Thus the association between the creativity continuum mean score and factors 1 and 2 are of similar strength. The association between the creativity continuum mean scores and factor 3 is weaker although still a moderate correlation. Therefore, it appears that the creativity continuum measure is more closely associated with beliefs about creative ability than the actual making of a creative product.

Thus, the creativity continuum has demonstrated validity through unidimensionality. To determine evidence of concurrent validity the creativity continuum will now be correlated with the openness to experience question.

## 5.5. THE OPENNESS TO EXPERIENCE QUESTIONNAIRE

The version of the Openness to Experience scale used in this questionnaire was a shortened version designed by Buchanan (2001). Buchanan et al (1999) have attempted to validate this version using factor analysis. They claim that the Openness items that they use in their online version all load most strongly onto the same factor of openness that is distinct from the other four personality traits. The Openness scale was scored so that the higher the score the more open, and therefore possibly creative, the person is believed to be.

A principal components analysis was first performed on the Openness to Experience question. Again three factors emerged that explained the majority of the variance (69%) (Table 10). Nevertheless, the statements did not all weigh as strongly on the first factor as those in the creativity continuum.

**Table 10. Component Matrix(a)**

	Component		
	1	2	3
Do not like art	.780	-.335	
Believe in the importance of art	.742		-.229
Do not enjoy going to art museums	.711	-.334	-.259
Am not interested in abstract ideas	.612		.522
Tend to vote for liberal political candidates	.322	.726	-.319
Tend to vote for conservative political candidates	.434	.676	
Avoid philosophical discussion	.509		.678

This is more clearly demonstrated when varimax rotation is performed (Table 11). However, it should be noted that although some of the statements that load on the same factor appear to be in opposition (for example “Do not like art” and “believe in the importance of art”) they have rotated in the same direction because they are reverse scored.

**Table 11. Rotated Component Matrix(a)**

	Component		
	1	2	3
Do not like art	.851		
Do not enjoy going to art museums	.822		
Believe in the importance of art	.768		
Avoid philosophical discussion		.853	
Am not interested in abstract ideas	.258	.759	
Tend to vote for liberal political candidates			.854
Tend to vote for conservative political candidates			.786

Thus, for the population in this study, the Openness to Experience question appears to be measuring three more distinct factors. In the first (component 1) all statements are about art. The second is looking at philosophical discussion and abstract ideas and the third is about voting tendencies.

Interestingly, Buchanan et al's (1999) factor analysis of these items present similar results as the same items weigh most strongly on the same components. The art questions "believe in the importance of art", "Do not enjoy going to art museums" and "Do not like art" have the highest loadings of 0.76, 0.73 and 0.67 respectively. The abstract ideas and philosophy statements then have the next highest loadings of 0.63 and 0.55 respectively and the voting tendencies questions both load at 0.39 (Buchanan et al., 1999). However, Buchanan et al are comparing these items to those from the rest of the Five Factor Model and not considering the openness items separately. Therefore, they do not further investigate the possibility of these items actually measuring more than one factor.

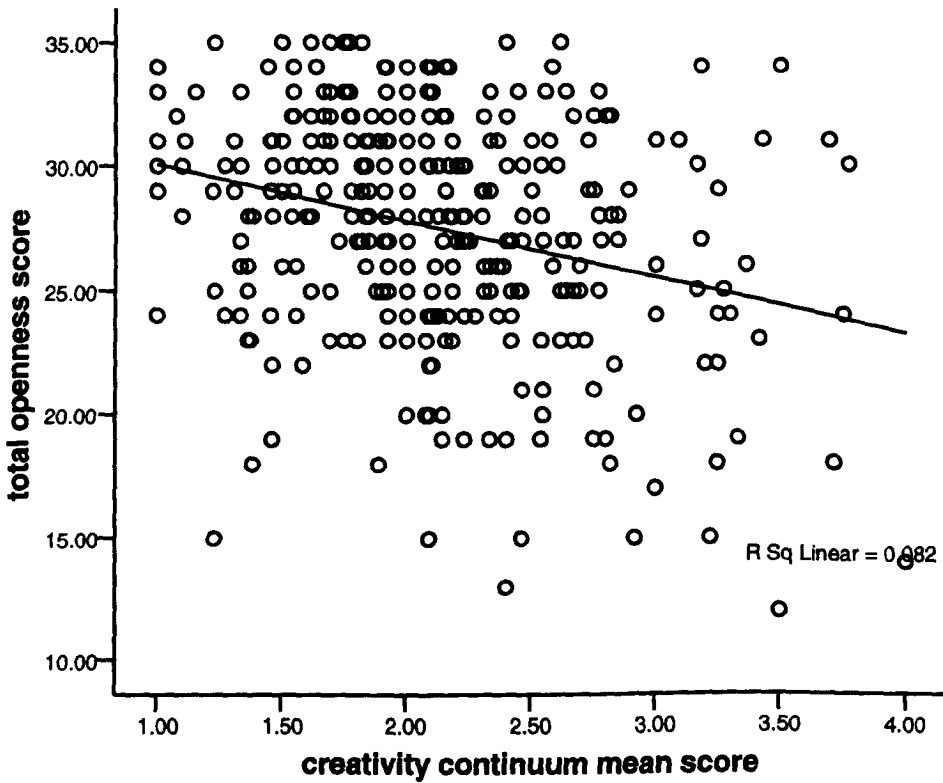
Thus, the sample used in this study has produced similar results for the Openness to Experience scale as those for Buchanan et al (1999). Whilst the Openness



scale is generally considered to be a valid measure of creativity, the creativity continuum in this study has been found to be a more unidimensional scale than the Openness to Experience scale as revised by Buchanan et al (1999).

Since both the creativity continuum and the Openness to Experience scale are measuring creativity it would be predicted that there would be a linear relationship between these two variables. Since the questionnaire was designed so that the two sets of questions are scored in opposite directions a negative relationship would be anticipated. Given that the Openness to Experience scores are not normally distributed, a non-parametric test was performed. The correlation between these two variables was significant but weak ( $\rho = -.263$ ,  $p=0.01$ ). The scattergram (Fig 4) also shows that the relationship between the two is not a strong linear relationship.

**Fig 4. Scattergram of Creativity Continuum Mean Scores and Openness Scores**



Since it has been claimed that creativity is related to Openness to Experience (McCrae, 1987) it would be expected that Openness and the creativity continuum would be strongly correlated. In fact, McCrae claims that openness is significantly positively related to the Creativity Personality Scale (CPS) scores. However, while these correlations were statistically significant the correlations ranged from .26 to .61, which suggests only weak to moderate associations (Dancey & Reidy, 2002). Furthermore, the correlation between the ACL Creativity Personality scale and the NEO Personality inventory Openness scale is .46 which again suggests only a moderate association (McCrae & Costa, 1997). Thus, the relationship between openness and the creativity continuum may be

due to them measuring different aspects of creativity that have some relationship but are not equivalent. While openness suggests a propensity towards creative ability this does not mean that individuals high in openness will produce anything creative or be considered particularly creative, which may explain why these two measures are not as closely related as first anticipated. This may also explain the skewed distribution of openness scores (Fig 5) and the more normal distribution of creativity continuum mean scores (Fig 3).

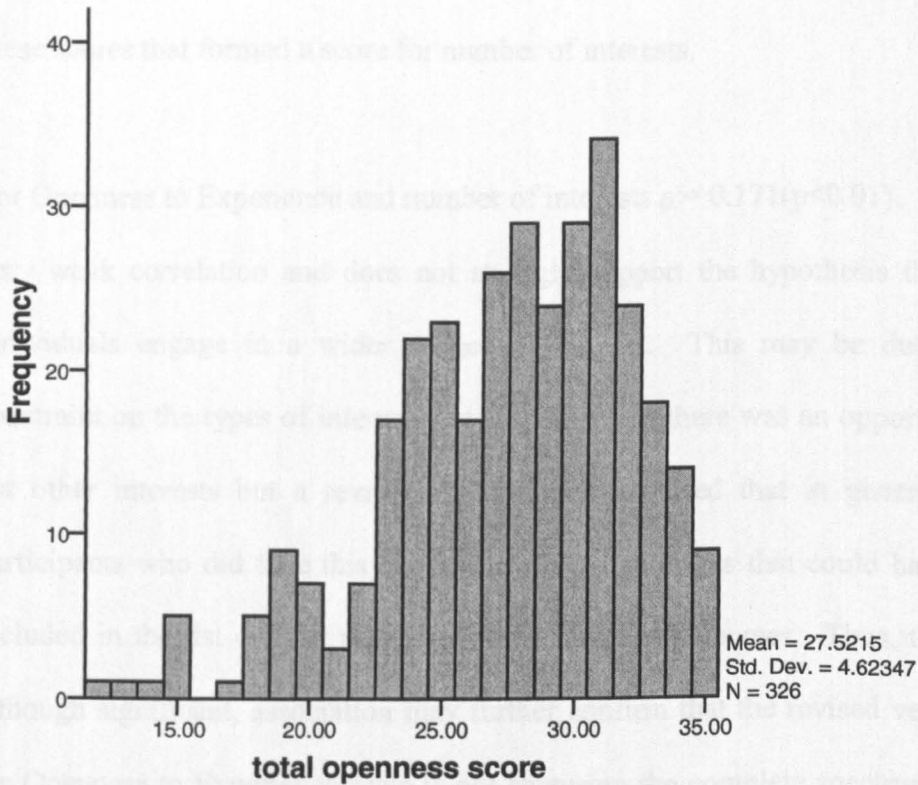
Furthermore, it should be remembered that the Openness to Experience scale used in the questionnaire was a revised version (Buchanan, 2001). This consists of only seven questions with a strong emphasis on art. In fact, questions on fantasy and attention to inner feelings present in the original Openness scale have been excluded. Furthermore, the two political statements “tend to vote for conservative political candidates” and “tend to vote for liberal political candidates” may not translate accurately from an American population to one that is predominately British. Thus, the revised version may in fact only be measuring a part of the concept of openness as defined by McCrae & Costa (1997).

Moreover, the sample of predominantly students or those working in academia, although not a typical university sample, may skew the openness results (Fig 5) since the majority of the questions in the revised scale may have an association with highly educated individuals. Those who are highly educated may be more likely to seek out cultural experiences, such as attendance at museums, without necessarily possessing a deep appreciation of the experiences these events

provide. Whilst McCrae & Costa (1997) use this argument to say that their Openness to Experience scale is more than just culture the revised version may fall into the trap of measuring cultural experience as opposed to true Openness to Experience in certain samples due to a narrowing of the content of the scale.

Also, since creativity is a desirable personality trait, participants may have scored more highly as they wish to be considered creative. This is much easier to do on the Openness scale since the questions are not asking about assessing creative ability but rather beliefs and ideas. This may in part account for the skew in Openness to Experience scores (Fig 5) and the more normal distribution of the creativity continuum means (Fig 3). Furthermore, the skew may be a result of the types of individuals attracted to questionnaires, particularly those on creativity and in fact 56% of participants were found to actively participate in one or more of the interests in question 16 (Appendix 4) which would suggest that the participants were more likely to engage in creative activities. However, a bias in creativity continuum scores would also be anticipated if this was the case and this was not found. In fact some of the activities listed in question 16 may not be considered particularly creative and so it does not appear that there is a strong bias towards more creative individuals completing the questionnaire.

**Fig 5. Distribution of Participants' Openness to Experience Scores**



### 5.5.1. Interests, Creativity, and Openness

According to McCrae & Costa (1997) open people participate in a wide and varied range of pursuits. Therefore, it would be anticipated that there would be a strong positive relationship between openness scores and the number of interests that a person is actively involved in. Therefore, correlations were computed between Openness to Experience scores, creativity continuum mean scores, and interests over the past 12 months. All interests were included since McCrae & Costa (1997) state that the range of interests of open individuals does not only include intellectual, and also presumably creative, pursuits.

To gain an indication of the number of interests a respondent was actively engaged in the number of responses to “involved in production of or actively participate in” and “make all or part of my living from” were collated and it was these scores that formed a score for number of interests.

For Openness to Experience and number of interests  $\rho = 0.171(p < 0.01)$ . This is a very weak correlation and does not strongly support the hypothesis that open individuals engage in a wider range of interests. This may be due to the constraint on the types of interests listed. However, there was an opportunity to list other interests but a review of these demonstrated that in general those participants who did take this opportunity listed activities that could have been included in the list or they mentioned their university courses. Thus, this low, although significant, association may further confirm that the revised version of the Openness to Experience scale is not capturing the complete spectrum of the concept as defined by McCrae & Costa (1997).

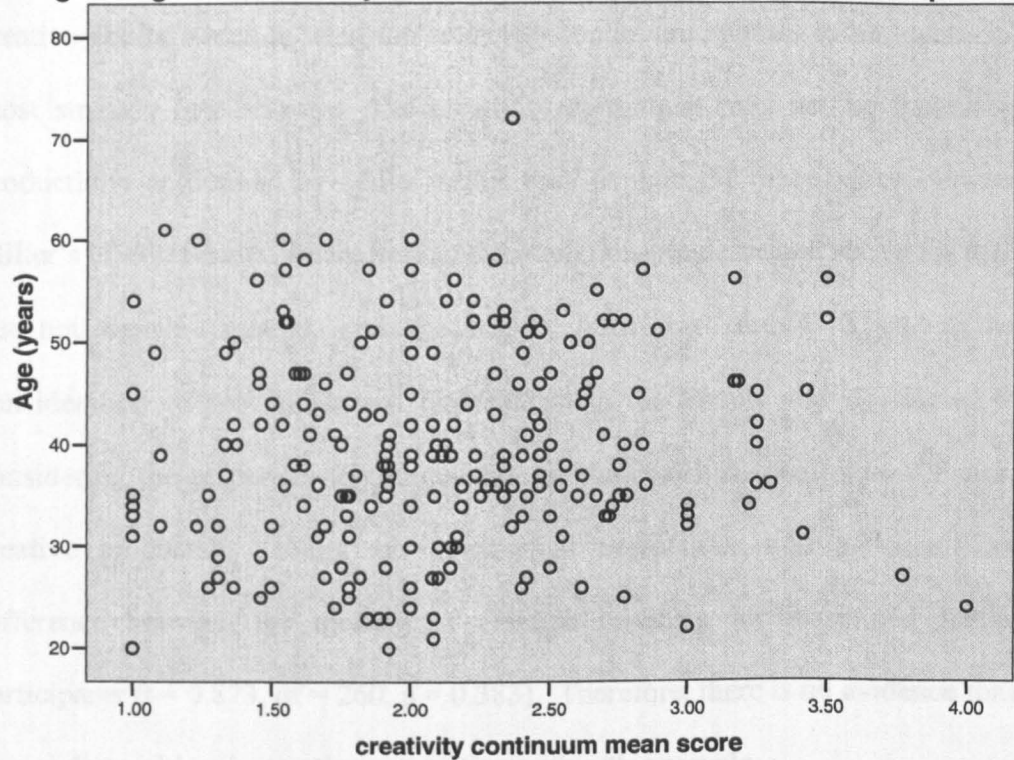
For creativity continuum and number of interests  $\rho = -0.364 (p < 0.01)$ . This is a weak to moderate correlation and suggests that those higher in self-rated creative ability engaged in more interests. However, creativity continuum mean scores would not necessarily be expected to be associated with numbers of interests since it is possible to be high in creativity on the creativity continuum and not participate in any of the interests listed. Also one needs only to be highly creative in one area to be rated as highly creative on the creativity continuum. The relationship between number of interests and creativity continuum mean

score is negative as would be expected due to the scoring of the creativity continuum (a low score means that the person has scored high in creativity).

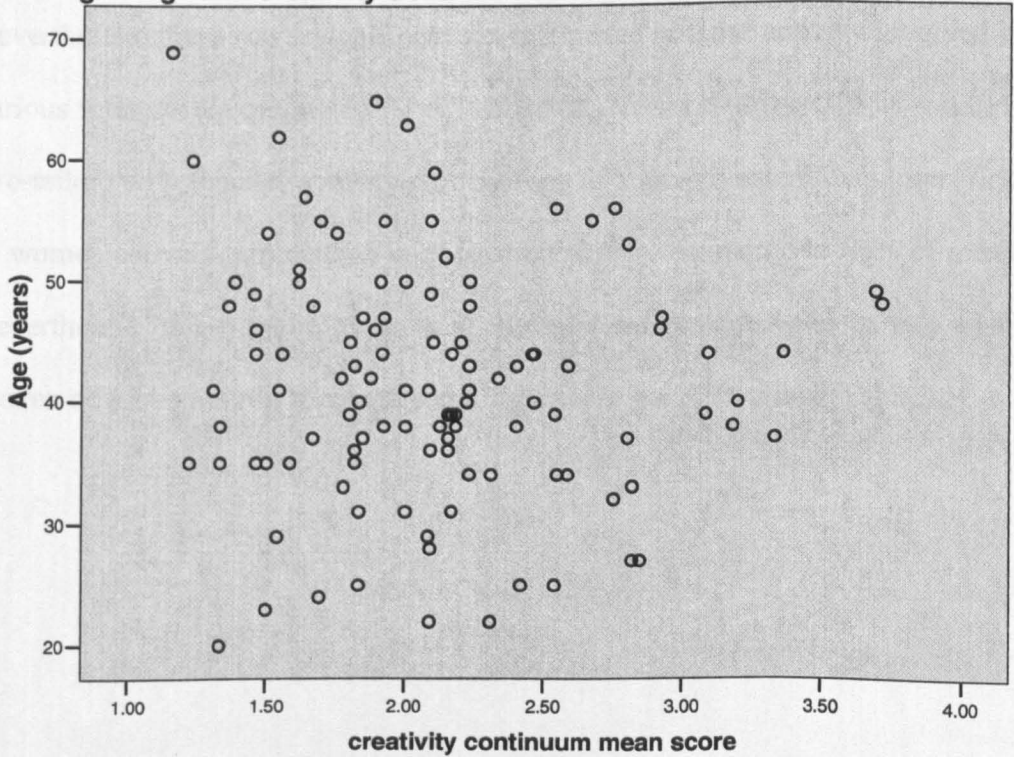
### **5.5.2. Age, Sex, Creativity, and Openness**

According to Miller (1999) the production of creative products varies throughout the lifespan with a peak at young adulthood when sexual competition is greatest. Furthermore he found evidence of sexual dimorphism in the production of creative products with males producing considerably more than females (Miller, 1999). However, there is evidence that for both sexes it is not the chronological age but the length of time in a career that influences creative output (Simonton, 1997, Simonton, 1999) therefore, since the majority of people will start their career in their 20s, there may be expected to be a peak in creative output for the majority in their 30s to 40s. It could therefore be hypothesised that the age of the participant would have an influence on their creativity continuum mean score if it is assumed that the creativity continuum score has some relationship with productivity. Nevertheless, a consideration of the scattergrams for male and female participants indicates that there appears to be no relationship, whether curvilinear, inverted-U or linear (Fig 6 & 7). Moreover, correlations between the two variables showed no relationship between them, further confirming the absence of a linear relationship (for males ( $r = -0.089$ ,  $p = 0.342$ ) and for females ( $r = 0.035$ ,  $p = 0.600$ )). Also, using an independent t-test there was no significant difference between the creativity continuum mean scores for male and female participants ( $t = 0.189$ ,  $df = 342$ ,  $p = 0.851$ ). Thus arguing against there being sexual dimorphism in creative production or ability.

**Fig. 6. Age and Creativity Continuum Mean Scores of Female Participants**



**Fig. 7. Age and Creativity Continuum Mean Scores of Male Participants**





Nevertheless, Miller's (1999) study was looking at products and not perceived creative ability which is what the creativity continuum appears to be measuring most strongly (see above). The creativity continuum may not be measuring productivity as defined by Miller which may explain the discrepancy between Miller's (1999) results, where he found the relationship described above for male but not female creators, and the results from this study. Thus, further consideration of possible sexual dimorphism in the sample was conducted by considering the responses to the question in the creativity continuum "I make creative products". Using an independent t-test there was no significant difference between the making of creative products for male and female participants ( $t = 0.873$ ,  $df = 260$ ,  $p = 0.383$ ). Therefore, there is no evidence for a sexual dimorphism in creative production within this sample.

Nevertheless, there was a significant sex difference in those actively involved in various interests (question 16) ( $U = 11218.500$ ,  $N_1 = 119$ ,  $N_2 = 225$ ,  $p = 0.011$ , two-tailed) with females actively participating to a greater extent than men (72% of women actively participated in at least one hobby compared to 66% of men). Nevertheless, this may be to do with the interests provided and in fact when broken down by interest there are some significant sex differences (Table 12).

**Table 12. Chi-Squared Tests for the Listed Interests and the Sex of the Participants.**

Interests	$\chi^2$	df	p value	Cramer's V	Direction of sex difference
Sport	16.258	2	.000	.218	m>f
Theatre	4.837	2	.089	.119	ns
Mathematics	7.585	2	.023	.149	m>f
Dance	11.237	2	.004	.182	f>m
Novels & Stories	14.539	2	.001	.207	f>m
Poetry	15.945	2	.000	.217	f>m
Science	7.885	2	.019	.152	m>f
Politics	5.182	2	.075	.123	ns
Religion	1.890	2	.389	.075	ns
Crafts	27.647	2	.000	.284	f>m
Visual Arts	18.704	2	.000	.234	f>m

Note: It was not possible to compute  $\chi^2$  for cinema, television, or music because there were 1 or more cells with an expected count less than 5.

From the above table it can be observed that there are significant sex differences in active participation in some interests which would suggest differences in production. However, these differences may be due to gender role stereotypes since the participants appear to be actively involved in interests often considered to be particular to their sex. If this is the case then it argues against there being general sexual dimorphism in creative display. Moreover, as can be observed from the Cramer's V values, only a small amount of the variation in levels of interest/participation can be explained by the sex of the participants.

The lack of an association between a person's self-rated creative ability and their age and sex may be an artefact of the sample as the majority of participants are students, many of which are mature students, and so may be changing careers or developing their abilities and so may be perceiving themselves as more or less creative depending on the stage of study they are at. Also, Miller considered

professional creators and independent evidence of actual products unlike this study.

**5.5.3. Summary**

What has emerged is that there appears to be problems with the Openness to Experience scale as revised by Buchanan (2001) actually measuring the concept of openness as defined by McCrae & Costa (1997). This therefore produced only a weak correlation with the creativity continuum mean scores. However, the creativity continuum demonstrates some evidence of being an effective measure of participants' self-rated creative ability. This can then be used in future projects to assess creative ability in relation to the general population as defined in this study. Further work on other populations needs to be done before the continuum can be assumed to generalise to a wider population.

**5.6. THE CREATIVE PRODUCT**

Question 12 asked participants to identify the five most important aspects that make a product creative. All options are considered to be important so those chosen were the most significant aspects from a list of features that have not previously been ranked. The five most frequently chosen aspects were

**Table 13. Five Most Frequently Chosen Aspects That Make A Product Creative**

ASPECTS	% OF PARTICIPANTS WHO CHOSE ASPECT
It is original	77%
It is inspirational	67%
It provokes interest	65%
It communicates ideas and/or emotions	61%
It stimulates an emotional response	59%

That original is the most commonly chosen aspect is unsurprising and supports definitions in the academic literature. It is also found to be a commonly used term in implicit definitions of creativity as found in analysis of the responses to question 9 (see above). In fact, none of the aspects most frequently chosen are unexpected. The five aspects that were least often chosen can be seen in Table 14.

**Table 14. Five Least Frequently Chosen Aspects That Make A Product Creative**

ASPECTS	% OF PARTICIPANTS WHO CHOSE ASPECT
It is complex	5%
It is logical	10%
The combination of its physical features	13%
It is understandable	15%
It is attractive	24%

All of the first four aspects in Table 14 are phrases that are associated more with science and technology than the arts and since participants were in general considering arts activities as opposed to science and technology activities (see above) when completing this survey this may have been why these aspects were rated much lower than some of the others.

“It is complex” may have been rated as particularly low since a creative product requires there to be a balance in the level of complexity (Besemer & O'Quin, 1986, Ochse, 1990). Too much will confuse the observer and too little will not hold their attention. “It is complex” may imply too much complexity, which would explain the rejection of this statement by the majority of participants.

Interestingly, “It is complex” had a non-significant relationship with sex ( $\chi^2=.622$ ,  $df=1$ ,  $p=.430$ ). However, “It is logical” had a significant association with sex ( $\chi^2=6.962$ ,  $df=1$ ,  $p=.008$ ) with men (15%) being more likely to choose this aspect than women (7%). It may be that logical tends to be a word more favoured by men than women or that the types of creative products considered by men are more likely to be described using this term. For example men may consider science and technology products more than women although this was not found to be the case when analysing the results for question 10 (Table 7).

A more unexpected result was that “It is attractive” was considered by only a relatively small number of respondents (24%) to be a particularly important aspect of creativity. This appears to argue against aesthetic theories that attempt to explain the evolution of art (Orians & Heerwagen, 1992) and the use of the term in definitions of creative products (Runco, 1999). Furthermore, of those that did chose attractiveness there was not a significant relationship between choosing this option and the sex of the participant ( $\chi^2=3.517$ ,  $df=1$ ,  $p=0.061$ ).

Further  $\chi^2$  tests were conducted to identify whether there were any sex differences in responses to some of the other options chosen. The results for “It is original” ( $\chi^2=1.154$ ,  $df=1$ ,  $p=0.283$ ) and “It communicates ideas and/or emotions” ( $\chi^2=3.460$ ,  $df=1$ ,  $p=.063$ ) were non-significant. However, there was a significant association between choosing “It stimulates an emotional response” and gender ( $\chi^2=4.519$ ,  $df=1$ ,  $p=0.034$ ) with women (65%) being more likely to chose this option than men (51%). This may be due to women feeling more comfortable with the suggestion of emotion than men. However, “It

communicates ideas and/or emotions” which may be considered less gender biased, whilst not significant is nearing significance and the percentages of women and men choosing this option is 65% and 55% respectively. Thus, women may be more receptive to interpreting a creative product as communicating to them than men. This is further supported by the response to the option “It reflects something of the creator” which was chosen by 42% of the participants. A  $\chi^2$  test shows that there is a significant relationship between choosing this option and the sex of the participant ( $\chi^2=6.962$ ,  $df=1$ ,  $p=0.008$ ) with women (48%) being more likely to choose this option than men (33%). This could be used to support the sexual selection hypothesis that the creative product is communicating information about the creative individual. It could also support the sexual dimorphism hypothesis, that women are assessing the products and men displaying them, to some extent although this result does not suggest that women are not making and displaying creative products as well.

Interestingly, if the three statements “It communicates ideas and/or emotions”, “It stimulates an emotional response” and “It reflects something of the creator” are grouped together as indicating that the product is communicating to the observer then it is found that 85% of respondents chose one or more of these categories. From the sexual selection viewpoint, this would suggest that the creative product may be acting as a fitness indicator.

However, it was found that there was a significant difference in creativity continuum scores between those who chose “it communicates ideas and/or emotions” and those who did not ( $t = 2.978$ ,  $df = 323.123$ ,  $p = 0.003$ , two-tailed)

(note: Levene's test for equality of variances found variances to be unequal and so the results for equal variance not being assumed are reported here). Thus, those who chose this option had lower creativity continuum scores (mean = 2.05) than those who did not (mean = 2.23). This suggests that the idea that creative products communicate ideas and emotions is more strongly held by more creative individuals.

There was also a significant difference in creativity scores for "it is original" ( $t = -2.790$ ,  $df = 342$ ,  $p = 0.006$ ). Thus, those who chose this option had higher creativity continuum scores (mean = 2.16) than those who did not choose it (mean = 1.96). This suggests that the need for originality is more important in defining a creative product for more creative individuals. There were no other significant differences when considering creativity scores.

## **5.7. JUDGES OF CREATIVE PRODUCTS**

In the academic literature, although there is no clear consensus as to who acts as judges to determine which products are creative it is the creators and experts who tend to be considered.

**Table 15. Percentage of Participants Who Rated the Opinion of Possible Judges of Creative Products along a Five Point Scale.**

	<b>Extremely valuable</b>	<b>Somewhat valuable</b>	<b>Not very valuable</b>	<b>Not at all valuable</b>	<b>Not applicable</b>
<b>The person who makes the product</b>	35%	43%	16%	5%	1%
<b>Tutors/teachers of the creator</b>	17%	59%	17%	5%	2%
<b>People at the creator's place of work</b>	12%	54%	24%	7%	3%
<b>The people who use/view the product</b>	68%	23%	7%	1%	1%
<b>People who make similar products</b>	27%	53%	14%	4%	2%
<b>Friends of the creator</b>	5%	33%	45%	15%	2%
<b>People who sell the product</b>	17%	37%	29%	14%	3%
<b>The media</b>	14%	40%	28%	16%	2%
<b>The creator's family</b>	6%	28%	41%	20%	5%

However when considering the results from this sample, the opinions of people who use/view the products were felt to be the most valuable with 91% of participants believing their opinion to be either extremely or somewhat valuable (Table 15). In fact, this group was the only one that scored most highly in the extremely valuable category. Therefore, there appears to be a strong consensus that people who use/view the creative product should define what is considered to be creative in society. Whilst it could be argued that the higher number of Business School students may have created this bias since they may be more likely to value marketable creative products this group is not large enough to have created such a strong bias towards this result. Interestingly, this result does supports the sexual selection hypothesis that views the opinions of those who



have the opportunity to view the product, regardless of their own creative ability or knowledge, as being of primary importance in deciding the quality of the product.

Other judges whose opinions were considered to be either extremely or somewhat valuable by the majority of respondents were the creator (78%), tutors/teachers of the creator (76%), people at the creator's place of work (66%), and people who make similar products (80%). Both people who sell the product and the media found participants nearly equally split between considering these groups' opinions to be valuable and not valuable. Unsurprisingly, the opinions of those groups personally involved with the creator, friends and family, were considered less relevant. Sixty percent of participants felt that the opinion of friends of the creator to be not very valuable or not at all valuable and 61% of participants rated the family similarly. None of these results are really surprising since those with some knowledge of the product were all rated more highly than those who are connected to the creator by personal relationship only and may have no knowledge of the product at all. Nevertheless, Runco (1999) found creators to be poor judges of their own creative products and then broadened this to propose that creators are poor judges of creative products in general. He suggested that this may be partly attributable to creative production and assessment of creativity being separate abilities so that good judges may not be very good creators. However, while highly creative individuals may be poor judges of their own products due to the personal investment made they may be good judges of products by others, particularly products that do not compare with and thereby threaten their own work.

Those who sell the product and the media may or may not have knowledge of the products, which may explain the split in opinion with these groups. Furthermore, whilst people who use/view the product may or may not have expert knowledge they certainly have an interest and possibly a practical knowledge of the product. Thus, the level of knowledge about a product may be hypothesised to be a deciding factor in the appropriateness of whether someone judges a product to be creative.

There was a weak but statistically significant correlation between creativity continuum mean score and ratings for “the person who makes the product” ( $\rho = 0.132$ ,  $p = 0.015$ ). This is positive so the higher the person is in self-rated creative ability the more valuable they considered the creator’s opinion to be in deciding whether a product is creative. This is not an unexpected result. There were also significant positive correlations for “people at the creator’s place of work” ( $\rho = 0.132$ ,  $p = 0.016$ ), “friends of the creator” ( $\rho = 0.185$ ,  $p = 0.001$ ), and “the creator’s family” ( $\rho = 0.145$ ,  $p = 0.008$ ). Whilst these results may appear surprising those who are highly creative may have colleagues, friends and family who are also highly creative and so their opinions may be considered more valuable than would generally be the case. Nevertheless, there was no significant association between creativity continuum mean scores and ratings for “people who make similar products” which might be expected as highly creative individuals would presumably value the opinions of at least some of their peers. Furthermore, none of the other categories were significantly related to the creativity continuum scores of the participants.

When a  $\chi^2$  test was conducted to identify significant relationships between the ratings of judges and the sex of participants there were only two statistically significant results. The ratings for “the person who makes the product” and the sex of the participant showed a significant association ( $\chi^2=13.270$ ,  $df=3$ ,  $p=.004$ ) with females rating the creator’s opinion as to the creativity of the product as more valuable than males (Table 16).

**Table 16 . Ratings of male and female participants for the value they place on the opinion of "the person who makes the product" being a judge of the creative product**

			"The person who makes the product"				Total
			extremely valuable	somewha t valuable	not very valuable	not at all valuable	
sex	male	Count	31	50	26	11	118
		% within sex	26.3%	42.4%	22.0%	9.3%	100.0%
	female	Count	90	97	28	8	223
		% within sex	40.4%	43.5%	12.6%	3.6%	100.0%
Total		Count	121	147	54	19	341
		% within sex	35.5%	43.1%	15.8%	5.6%	100.0%

The other option that showed a statistically significant association with sex of participant was “tutors or teachers of the creator” ( $\chi^2=17.816$ ,  $df=3$ ,  $p<0.001$ ) with females again rating the tutor or teachers’ opinions as more valuable than males (22% of females rated these individuals’ opinion as extremely valuable compared to 8.5% of males).

Thus, it can be surmised that knowledge of a creative product is an important factor in whether someone’s opinion should be influential in deciding whether a product is creative. Nevertheless, it is those people for whom the product is made for that are considered to have the most valuable opinions when judging a

product's creativity. However, when a product is available for a large number of people a consensus as to its creativity may be difficult to reach. This suggests that in these instances personal opinion is valid and a consensus may not be necessary. However, those people with knowledge of the product, such as tutors and teachers, may be important as a guide to lay people although access to these people's opinions may not always be possible.

### **5.8. PERSONALITY TRAITS**

Using adjectives that were rated by teachers and parents in the USA for creativity and desirability (Runco & Johnson, 2002), the traits in question 14 were rated as desirable or undesirable. The desirable traits were intelligent, artistic, independent, warm, persuasive, non-conforming, flexible, emotionally sensitive, persistent, and extroverted. Whilst there were no similar adjectives from Runco & Johnson's (2002) study, sensual and scientific were also classed as desirable. Undesirable traits were lacking in confidence, introverted, arrogant, closed-minded, impulsive, and hostile. Risk-taker was problematic since cautious, which could be classed as its opposite, was defined as desirable by parents and undesirable by teachers in the USA. This is probably because it depends on the risks involved and the consequences of these risks, as to how one views being a risk-taker. Therefore, risk-taker was left as being in either category.

When the ratings for these personality traits were considered all those that scored most highly on "more than" were desirable traits apart from risk-taker which was classed as desirable/undesirable as discussed above (Table 17). Four traits, intelligent, emotionally sensitive, sensual and impulsive, were rated almost

equally between more than and no different from. All of these except impulsive were categorised as desirable.

The characteristics that scored most highly on “no different from” were a mixture of desirable and undesirable traits (Table 17). Only closed-minded was rated most frequently as “less than” as would be predicted. Therefore, whilst theoretically all of the personality characteristics, apart from lacking in confidence, warm, closed-minded and sensual, should have been rated predominantly in the “more than” category it was the desirable characteristics that were thought to be more common in highly creative individuals and the undesirable characteristics were in general rated as being in the same degree as that of a person in the general population. This pattern suggests that the personalities of creative individuals are, at least in this sample, considered in a positive light. Thus, the stereotype of a creative individual is perhaps more attractive than is in general the reality. Since this possibility gains support from studies by Gluck et al (2002) and Runco & Johnson (2002) it suggests that creative individuals are viewed as having desirable characteristics that would be attractive to potential mates as predicted by the sexual selection hypothesis.

**Table 17. Percentage of Responses as to the Extent to which a Highly Creative Individual Would Possess each of the Personality Traits.**

<b>Personality traits</b>	<b>% of "more than" responses</b>	<b>% of "no different from" responses</b>	<b>% of "less than" responses</b>	<b>% of missing responses</b>
Intelligent	51.7	48.0	0	0.3
Artistic	80.8	19.2	0	0
Lacking in Confidence	6.7	57.3	35.8	0.3
Independent	69.2	29.7	0.9	0.3
Warm	13.4	82.8	3.2	0.6
Introverted	9.0	73.0	17.4	0.6
Persuasive	29.4	66.6	3.5	0.6
Non-conforming	77.3	20.3	1.7	0.6
Arrogant	15.7	72.1	11.3	0.9
Closed-minded	2.6	23.0	73.8	0.6
Flexible	70.3	25.3	3.8	0.6
Emotionally sensitive	48.8	48.8	2.3	0
Persistent	62.2	36.0	1.5	0.3
Risk-taker	70.1	28.8	1.2	0
Impulsive	51.2	46.2	2.6	0
Sensual	43.0	54.9	1.7	0.3
Scientific	14.2	73.3	11.3	1.2
Hostile	2.0	68.6	29.1	0.3
Extroverted	21.5	71.8	6.4	0.3

Artistic scored the most highly in the “more than” category with 81%. No one rated it as being found “less than” in the general population. There was however a significant association between the rating of artistic and the sex of the participant with more women than men rating artistic as being present in greater quantities in highly creative individuals ( $\chi^2 = 6.966$ ,  $df = 1$ ,  $p = 0.008$ ). Scientific, on the other hand, was believed to be found more often in highly creative individuals by only 14% of the participants, with 73% believing that creative individuals are no more scientific than the general population. There was found to be no association between the sex of the participant and the rating of scientific ( $\chi^2 = 5.459$ ,  $df = 2$ ,  $p = 0.065$ ). This confirms the findings from questions 9 and 10 that found that very few participants identified science and technology words and activities as being linked with the term creativity.

Interestingly, participants were divided as to the level of intelligence present in a creative individual as compared to a member of the general population, with 52% believing that a creative person has more intelligence and 48% stating that there is no difference in the level of intelligence. It is also interesting to note that the words such as intelligent and clever were only found in 1.4% of responses when participants were asked to describe the term creative, which suggests that intelligent and creative are not closely associated in the minds of the respondents.

Sensual was the one trait that did not come from the academic literature but was included in an attempt to identify whether people considered highly creative individuals as sexually attractive as would be implied if creative behaviour is a sexually selected trait. The results were divided between highly creative

individuals being more sensual than the general population (43%) and those participants that considered creative people to be no different to a member of the general population in terms of being sensual (55%). Although sensual could be a term considered to have a gender bias, females being more likely to use the term than males, when a  $\chi^2$  test was conducted on the results in the “more than” and “no different from” categories they were non-significant ( $\chi^2 = 2.573$ ,  $df = 1$ ,  $p = 0.109$ ). Therefore, just under half the sample considered creative individuals to be more sensual than someone from the general population, which further supports the conclusion that the stereotype of a highly creative person is that they are more attractive than may be the reality.

Finally, in this section, a principal components analysis was conducted using varimax rotation to explore whether the personality traits fitted a Five Factor Model or whether they were tapping into other personality dimensions not related to this model as proposed by Paunonen & Jackson (2000). The results can be seen in Table 18.



**Table 18 . Rotated Component Matrix for Personality Variables of Highly Creative Individuals**

	Component						
	1	2	3	4	5	6	7
Introvert	-.802						
extrovert	.780						
persuasive	.505		.441				
sensual		.781					
emot sens		.742					
warm		.555					
impulsive		.520					
persistent			.784				
risk-taker			.729				
closemind				.721			
hostile				.701			
flexible				-.489			
arrogant					.660		
nonconf					.660		
independ						.708	
artistic						-.574	
intelligent							.651
lack confid	-.531						-.541
scientific							

As can be observed 7 factors emerged that accounted for 59% of the variance. The first factor included introverted, extroverted and persuasive and so is labelled extraversion. The second factor included sensual, emotionally sensitive, warm and impulsive and so appears to have properties associated with low neuroticism. Factor number three constituted persistent which would suggest conscientiousness (McCrae & Costa, 1987) and risk-taker which is often associated with sensation seeking, a domain related to extraversion. However, this factor may actually be related more to motivation since high motivation would enable an individual to be persistent and to perhaps be more likely to take risks. Factor four contained closed-minded, hostile and, in a negative direction, flexible. This factor therefore appears to be associated negatively with agreeableness (McCrae & Costa, 1987). The fifth factor includes arrogant and non-conforming which suggests both disagreeableness and openness to experience respectively. However, these may not be subsumed by the Big Five

but could be placed under egocentric behaviours (Paunonen & Jackson, 2000). Factor six includes independent and in a negative direction artistic. These are both adjectives that have been found to load most strongly on openness to experience although artistic loads in a positive direction (McCrae & Costa, 1987). Thus, although this factor appears to be related to openness it is difficult to explain the negative loading of artistic with a positive loading for independent. The final factor includes intelligence and lacking confidence. This can therefore be labelled intelligence, presuming that confidence was believed by the participants to come from intelligence. Scientific does not actually load on any of the factors and so may be a separate construct. Thus, although there are some parallels with the Five Factor Model these personality variables also appear to be tapping into other personality constructs. Moreover, when the factor scores were correlated with each other there were no significant correlations suggesting that these factors are independent of each other.

To conclude this section, the participants appear to possess a more positive view of artists than has been found in previous academic literature. These findings are relevant to an evolutionary view of creativity since personality is often an important factor in mate choice decisions (Botwin et al., 1997, Buss & Barnes, 1986) and so a more romanticised image of a creator by less creative individuals may lead to increased reproductive success for highly creative individuals.

## **5.9. DEFINING FACTORS OF CREATIVITY**

Interestingly, the results in question 15 (Appendix 4) were not exactly what would have been predicted by some of the psychology academic literature. The factor that was identified most frequently as being the most important in defining someone as being creative was “the mental process of developing the product” with 64% of participants giving it a score of one or two (Table 19). This was surprising since the majority (93%) of respondents were from a Western culture, which, according to the academic literature, is supposed to value the product as the most important aspect whereas it is apparently those from an Eastern culture who particularly value the mental processes. In fact, the end product was found to be the second most important factor with 53% of participants rating it with a score of one or two. However, this does partly support results from a study on implicit definitions of the term creative which found that participants more often chose words associated with the concepts of the creative process before they considered the product (Spiel & Von Korff, 1998). Nevertheless, this result may be because of the educational bias in the sample. Since the majority of respondents are either students or lecturers then mental processes may be more important to this sample because these are particularly important to them in their study or career. The range of ratings for each of the factors can be seen in table 19.

**Table 19. Percentage of Scores for Each Factor That May Define Someone as Being Creative**

	<b>Scores 1 &amp; 2 (most important)</b>	<b>Scores 3 &amp; 4</b>	<b>Scores 5 &amp; 6</b>	<b>Scores 7+ (least important)</b>
<b>The social recognition</b>	9%	21%	33%	37%
<b>The end product</b>	53%	19%	23%	5%
<b>The mental process</b>	64%	29%	6%	1%
<b>The times in which the person lived</b>	18%	30%	35%	17%
<b>The physical process</b>	27%	40%	26%	7%
<b>Their personality traits</b>	36%	31%	27%	6%
<b>The experiences the person had</b>	33%	32%	27%	8%

The social recognition was considered the least important factor. This may again be specific to this sample since the academic creative products produced by the sample will in general receive little recognition in the wider world as they are aimed at a limited academic audience. Therefore, social recognition is for the majority of respondents not a factor that defines their own products as creative. If this is the case then the responses to this question have become more personalised to the participants unlike the responses to some of the other questions such as what activities are creative which produced a strong arts bias.

There does seem to be some contradictions in the responses within the questionnaire as a whole since there appeared to be some indication that the product is produced for an audience as a majority of participants believed that the product communicates ideas and/or emotions and also that the people who use or view the product were felt to be the most important judges of a creative product. However, the social recognition was felt to be relatively unimportant to defining someone as creative. Thus, the participants appear to be saying that whilst end products are made for an audience the end product does not need to be

recognised as creative by society as a whole for it to be creative. However, there is a statistically significant weak positive correlation between social recognition ratings and scores for the end product ( $\rho = 0.236, p < 0.01$ ). Thus those that scored the end product as more essential to defining someone as being creative tended to also rate the social recognition as being more important. Therefore, it may be that tangible end products require social recognition to be thought of as creative but that less concrete end products, such as ideas, can be creative without evaluation by society.

It is also interesting that the personality and those experiences that may have shaped it are thought as reasonably important in defining someone as creative. This could suggest that the character of the creator is in some sense considered to be inextricably linked to the product which is supported by the results that the product communicates and reflects something of the creator (question 12). Thus, the product could be acting as an extension of the creator's personality, thoughts, and feelings and therefore his/her phenotype. However, there was a statistically significant weak to moderate negative correlation between ratings on the end product and personality traits ( $\rho = -0.355, p < 0.01$ ), and the end product and the experiences of the creator ( $\rho = -0.315, p < 0.01$ ). Therefore, the more important the end product is considered to be in defining someone as creative, the less important the personality traits and experiences were thought to be. It thus appears that with respect to these three factors participants either value the end product more or the personality traits and experiences more.

The correlation between the personality traits' scores and the experiences of the creator was statistically significant ( $\rho = 0.457, p < 0.01$ ). Thus, it seems that participants who rated the one factor higher tended also to score the other factor higher as well. This may not be surprising since personal experiences are often considered to affect an individual's personality and so the two factors may be viewed as having similar effects on the creativity of the person.

When chi-squared tests were conducted to identify the relationship between sex of the participant and ratings for the factors that define someone as being creative the only significant result was for “the physical process of making the product” ( $\chi^2 = 14.284, df = 3, p = 0.003$ ) with females placing more importance on this factor than men (Table 20).

**Table 20. Distribution of scores for "the physical process of making the product" for male & female participants.**

			The Physical process of Making the Product				Total
			Scores 1 & 2 (most important	Scores 3 & 4	Scores 5 & 6	Scores 7 + (least important	
sex	male	Count	16	46	38	9	109
		% within sex	14.7%	42.2%	34.9%	8.3%	100.0%
	femal e	Count	69	84	46	12	211
		% within sex	32.7%	39.8%	21.8%	5.7%	100.0%
Total		Count	85	130	84	21	320
		% within sex	26.6%	40.6%	26.3%	6.6%	100.0%

Furthermore, when the participants were divided as to whether they actively participated in any of the activities in question 16 (Appendix 4) then it was found that there was no significant relationship between active participation and ratings of the factors that define a person as creative. Since many of the activities could define someone who participated in them as creative then this suggests that more

creative individuals may not differ to the less creative individuals in their opinions as to what defines someone as creative.

### **5.10. CONCLUSION**

This questionnaire was designed as a preliminary analysis to identify a general population's implicit understanding of creativity.

Thus, from the results of the questionnaire creativity can be summarised by the following points.

- The term creativity suggests innovative, original and imaginative thought processes that generally lead to an end product.
- Concrete creative products are considered to be predominantly arts based.
- There is little consideration of science and technology being creative activities.
- Self-rated creative ability within this sample is normally distributed.
- There is no evidence of sexual dimorphism in self-rated creative ability.
- To be creative a product needs to be original, inspirational, to provoke interest and expresses ideas and/or emotions.
- A creative product does not need to be attractive.
- In general the level of knowledge about a creative product appears to be a deciding factor in whether someone's opinion is considered to be valuable in judging the creativity of a product.
- However, the most important judges of a creative product were considered to be the people who use/view the product.

- A highly creative individual's personality appears to be viewed in a more positive light than has found to be the case in the psychology research on creative individuals. Thus, the stereotype of a creative individual is perhaps more attractive than is in general the reality.
- The mental processes are considered the most important factor that defines someone as being creative whilst the social factors are considered the least important.

The creativity continuum has demonstrated evidence of unidimensionality and significant, although weak, associations with openness to experience and numbers of interests actively participated in. This suggests that it may be an appropriate tool for the measurement of self-rated creative ability although further validation is required.

There are however a number of limitations to this study that should be taken into account. Primarily, there needs to be a consideration as to the extent that the results from the sample can be generalised to the general population. Whilst this student population is much more diverse than those from a more traditionally organised university there continue to be some biases such as educational level and possibly socioeconomic status, although this was not measured within this questionnaire. Furthermore, the personality of those who choose to complete questionnaires may be different to those who do not and this may have an affect on the responses provided. Also, a questionnaire on creativity may attract those who believe themselves to be creative although this was not reflected in the creativity continuum scores. There may also be biases associated with



completing questionnaires on the Internet as opposed to more traditional methods although Hewson (2003) believes that it is possible to gain more representative samples through online studies. Moreover, there may be biases in the sampling since not all online conferences were used due to the large number of them and the fact that some of the moderators did not give permission for the link to the questionnaire to be placed on their conference. However, despite these concerns the results of the age distribution, diversity of occupations, and creativity continuum mean score suggest that the sample is approaching generalisability to the general population.

This questionnaire raises many interesting areas of possible further study. However, two areas of particular interest that suggests possible links with an evolutionary approach to creativity is that the product communicates ideas and/or emotions and may thus reflect something of the creator and that the personality traits of highly creative individuals are viewed in a more positive light than is evidenced by the psychology literature. The former is in line with the sexual selection hypothesis and art acting as a fitness indicator. However, the latter suggests that artists may gain a greater number of sexual partners through an interpretation of their personality although this may not be due to an accurate assessment of their personalities through their artwork but rather through a romanticised image that is associated with professional artists. Therefore, these aspects will be the basis of the next two studies within this thesis.

## **CHAPTER 6**

### **THE FITNESS INDICATOR STUDY**

#### **6.1. INTRODUCTION**

From the Definitions of Creativity study it appears that there is a widespread belief that creative products are communicating something to their audience (Chapter 5). In fact, Coe (2003) identifies this as a common belief about today's art when she states that art is often defined by the emotions it evokes. She further elaborates when she says that in cultures where art is non-traditional, in other words is not used for ancestral worship, "good art generally is said to show clear evidence of creativity and intellect and to evoke an emotional response in the viewers" (Coe, 2003).

This suggests that creative products may be acting as extended phenotypes of their creators. The extended phenotype is a concept proposed by Dawkins (1982/1999). This is the idea that the genes not only express themselves in the bodily make up of the individual but they also reach out into the environment beyond the body. For example a spider's web and a beaver's dam can be considered as extended phenotypes of these organisms.

Zahavi (1978) and Miller (2000a, 2001) support this view in relation to works of art and sexual ornamentation since they consider creative products to act as fitness indicators for sexual selection (Miller, 2000a, Miller, 2001, Zahavi, 1978). Thus, the creative products are acting to increase the survival of the genes by displaying the genetic and phenotypic fitness of the creator to potential sexual

partners with the aim of gaining more matings and thus offspring, thereby passing the genes on into the next generation. Miller (2001) believes that it is through the aesthetic qualities of the artwork that those looking at the art can gain insight into the artist's degree of creativity, intelligence, dexterity, and personality. The more the artist possesses the desired qualities the more or better quality mates he or she can potentially attract.

In fact, Miller (2000b) believes that creative products primarily evolved to advertise intelligence during courtship. Since during human evolution intelligence became ever more important to survival and so it increasingly became a relevant fitness indicator for mate choice (Miller, 2000b). When discussing intelligence Miller refers to the "g factor" or "general intelligence" as the type of intelligence various human fitness indicators would be advertising. Miller (2000b, 4) predicts that "generally, a mental trait's sexual attractiveness should correlate positively with its g-loading". Furthermore, he hypothesises that those mental abilities that emerged relatively late in human evolution should show much higher correlations with general intelligence than older mental abilities that we share with other great apes. This implies that creative abilities should be positively and highly correlated with g. However, the relationship between creativity and intelligence continues to be debated in the psychology literature (Chapter 2) and so it is difficult to predict the relationship between the two.

Studies of bowerbirds, the males of which build and decorate bowers to attract female mates, have demonstrated support for works of art acting as fitness

indicators. Female satin bowerbirds during the first stage of courtship assess the bower in the absence of the male bird (Coleman et al., 2004). This, according to Coleman et al (2004) allows the female to evaluate the bower and therefore decide whether to return to view the male. Thus, the “work of art” is used to evaluate the attractiveness and quality of the male before actually meeting him. However, in the case of human art there has been no direct test of whether artworks act as fitness indicators.

However, artworks are not only made by lone creators but are also made by groups of people. In fact, Dawkins claims that artefacts made by more than one individual can also be considered as extended phenotypes since although the genes reside in different bodies he considers that they are in fact acting as if they were one huge genome (Dawkins, 1982/1999). However, within this project since the sexual selection hypothesis of creativity is being investigated which emphasises competition between individuals, only products made by individual creators will be considered.

## **6.2. AIMS**

Thus, the broad aims of this project are

- To determine whether the qualities of the artist will be reflected in his/her artwork and that these can be accurately assessed by observers of the artwork.
- More specifically to identify whether the qualities which are evident are those predicted by Miller (2001) of creative ability, intelligence, openness

to experience, agreeableness, conscientiousness, neuroticism, and extraversion.

- To identify whether the assessments of the artists' qualities will be used in choosing the most desirable artist to go out on a date with so that those who are rated as being higher on desirable qualities such as creativity, intelligence and certain personality traits, such as agreeableness, will be selected most often.

### **6.3. THE "ARTISTS"**

Prior to the start of the experiment ethical approval was gained. Initially participants who represented a range of creative abilities as defined by the creativity continuum were required to make the artworks. The creativity continuum was chosen as the measure of creativity because it is measuring self rated opinions of actual creative behaviour and ability rather than a personality factor that is necessary but not sufficient for creative ability such as openness to experience. This distinction is important as someone may possess high degrees of one or several cognitive or personality factors that are necessary for creativity but may not engage in any overtly creative activities due to, for example, lack of motivation or opportunity. Such people would not then be classified as possessing high creative ability within Western society. Since sexual selection proposes that those who are actively creative are more likely to gain more matings then it is necessary to have participants who participate in creative activities to varying extents.

Participants who made the artworks (the “artists”) were recruited from a list of people interested in participating in psychology research at a University in the South of England. Initially the potential “artists” were not told about the full study but instead were emailed the creativity continuum and asked to complete it and indicate their sex and whether they were interested in participating in a further study (Appendix 5). This meant that participants for this study could then be selected as to their sex and position on the creativity continuum to ensure equal numbers of male and female “artists” who possess a broad range of creative abilities.

It was decided that there would be six male and six female “artists”. Raters judged only artworks made by the opposite sex. Twelve artists were chosen to provide a balance between statistical reliability and ease of participation. A greater number of artworks to be rated could generate rater fatigue. This could lead to the last artworks not being rated as thoroughly as the initial ones.

A range of scores along the creativity continuum was identified and then the relevant participants contacted. If they expressed an interest in the study an introductory letter (Appendix 6) was sent to them that contained further details. Those that continued to be interested were then contacted to arrange a date and time for them to participate. All participants were paid £20 on completion of all tasks.

The scores on the creativity continuum ranged for men from 1.08 (highly creative) to 3.40 (low self-rated creative behaviour) and for the women from 1.00

to 4.00. “Artists” were selected to represent a range along the continuum and therefore it was attempted to gain equal spacing between scores for the participants although this was not possible in all cases as not all scores were represented by respondents. The male “artists” had the following scores on the creativity continuum; 1.08, 1.62, 2.10, 2.40, 3.00, and 3.40 and the females had scores of 1.00, 1.62, 2.20, 2.77, 3.31, and 4.00.

### **6.3.1. The Personality Test**

The “artists” were also asked to complete Goldberg’s parallel version of the NEO-PI (Appendix 7). It was decided to administer a personality questionnaire to the “artists” since Miller (2001) claims that among the artist’s qualities that will be assessed through the artwork will be personality characteristics. Whilst Miller does not emphasise personality traits as much as he does intelligence the fact that these traits are commonly high in lists of mate preference studies (Buss & Barnes, 1986, Buss et al., 2001, Fletcher et al., 1999, Goodwin, 1990, Hester & Rudolph, 1994, Kenrick et al., 1993, Sprecher & Regan, 2002) testifies to their importance in choosing a mate. The personality traits that he names are openness, agreeableness, conscientiousness and low neuroticism (Miller, 2001), which are those found in the Five Factor Model of personality and therefore will be the model used in this study.

A review of the current literature established that the NEO Personality Inventory (NEO-PI) is the most commonly used personality instrument in psychology research. This consists of the “Big Five” personality dimensions of neuroticism, extraversion, agreeableness, conscientiousness, and openness to experience. Five

factors of personality have emerged in a large number of populations including those from different age groups and geographical locations as well as in both sexes (Costa & McCrae, 1992). Furthermore, personality traits have been found to be remarkably stable throughout adulthood after the age of approximately 30 years of age (Costa & McCrae, 1992).

The Five Factor model and the NEO-PI have been shown to demonstrate good validity and reliability. In fact, McCrae & Costa (1987) using self-reports and peer-ratings demonstrated that the Five Factor model and NEO-PI showed "...convergent and discriminant cross-observer and cross-instrument validation for all five factors" (McCrae & Costa, 1987). Moreover, the NEO-PI has also been found to demonstrate good concurrent validity (Furnham, 1996, Furnham et al., 1997). Furthermore, it assesses normal adult personality, which is more applicable to this sample, rather than being derived from a scale to measure personality in those with psychopathologies (Holland et al., 1995).

Another factor of the NEO-PI that is pertinent to this study is that the openness factor is correlated with artistic creativity (Costa et al., 1984, McCrae, 1987). Whilst problems with Buchanan's (2001) version of the Openness to Experience scale (Buchanan, 2001) in relation to it correlating with creativity were discussed in Chapter 5 this was probably associated with the fact that the items on the scale were greatly reduced compared to the NEO-PI and a number of the facets that comprise openness were omitted. Thus, a fuller version of the openness scale should show much stronger correlations with artistic creativity. This is of particular relevance to this experiment since correlations on the creativity



continuum can be measured against scores on the openness scale. Thus, providing a further measure for the validity of the creativity continuum. Also, creativity of the artwork, as scored by the raters, can also be correlated with the “artists” scores on openness to identify whether the personality factor of openness is found by independent raters to be expressed in the artwork.

For this study it was decided to use Goldberg’s Five-Factor Model (FFM) of personality traits from his International Personality Item Pool (IPIP) (International Personality Item Pool, 2001), which parallels the NEO-PI-R, rather than Costa & McCrae’s NEO-PI-R. This was in part due to problems in accessing the NEO-PI-R but also because the IPIP’s (2001) FFM of personality traits is a shortened version with 100 items as opposed to the 240 items of the NEO-PI-R. This was important since the “artists” were asked to do a number of tasks and it was felt that the shortened version would encourage participation and reduce fatigue thereby helping to ensure that participants completed the questions with consideration and therefore more accurately.

From the coefficient alphas in Table 21 it can be seen that the IPIP FFM scales exhibit an acceptable degree of internal consistency. Further support for this comes from Oswald et al’s 2004 study that demonstrated alphas of .88, .81, .83, .84 and .76 respectively for the scales of extraversion, agreeableness, conscientiousness, emotional stability (essentially the opposite of neuroticism) and openness. Moreover, the correlations for the NEO-PI-R versus the corresponding IPIP scales demonstrate that the IPIP FFM 20-item scale closely

parallels the NEO-PI-R and thus findings from studies of the NEO-PI-R should be applicable to the parallel IPIP NEO domains.

**Table 21. A Comparison between the Scales in Costa & McCrae’s NEO Personality Inventory (NEO-PI-R) and the Corresponding Preliminary IPIP Scales Measuring Similar Constructs.**

20-Item IPIP Scales	Coefficient Alpha IPIP	Correlation IPIP vs. NEO
Neuroticism	.91	.86 [.93]
Extraversion	.91	.79 [.88]
Openness	.89	.83 [.92]
Agreeableness	.85	.78 [.90]
Conscientiousness	.90	.80 [.88]
Mean	.89	.81 [.90]

**Note.** {Values in brackets are correlations corrected for unreliability; these may be underestimates, given that the reliabilities of the factor markers were assumed to be the same as those of the corresponding IPIP scales]  
 Taken from the IPIP (2001)

Thus, the IPIP parallel 100 item version of the NEO-PI-R was used due to its good validity, ease of access and ease of administration.

### 6.3.2. The Artworks

Participants were required to make one product that expressed something about themselves from a range of art/craft materials (Appendix 8 & 9). What they were expressing did not need to be obvious since they were asked to write this down once they had completed the artwork. They were given a maximum of one hour in which to do this and were told that the artwork should not exceed 45cm³. All participants were provided with exactly the same craft materials and told that they could use as much or as little of the materials as they required.

To ensure that the most appropriate materials were being used in making the products and that the instructions were unambiguous, clear and realistic the first three participants were asked for feedback on the quantity and types of materials as well as their comprehension of the instructions. The participants indicated that the materials were appropriate and adequate for the task and there were no difficulties in understanding the instructions.

Two rooms were used in which the participants made the “artworks”. These rooms were sparse, containing tables, chairs, computers, and other items of furniture but no posters or objects that could have influenced or inspired the “artists” in the making of their artworks. Thus, each participant experienced very similar experimental conditions and so environmental stimuli should not have caused a bias in the production of the products by different participants.

All participants made the artworks first and then went on to complete the Wechsler Abbreviated Scale of Intelligence (WASI). Two female participants completed the intelligence test on a separate day from making the artwork due to time constraints with their work. This did not appear to have any noticeable effect on either task.

### **6.3.3. Wechsler Abbreviated Scale of Intelligence (WASI)**

Since Miller predicts a strong relationship between creative abilities and *g*, as discussed earlier, it was decided to score the “artists” on a scale of general intelligence (the WASI), as well as the creativity continuum to identify whether there was any correlation between these two variables. Furthermore, correlations

between intelligence scores and desirability of the “artists” as a partner, as determined by their frequency of being chosen to go out on a date with, can be carried out to identify whether intelligence is being used in mate choice decisions.

Wechsler has developed a number of intelligence scales, which measure general intelligence as well as performance on a number of subsets, and these are the most frequently used intelligence tests in Europe and the UK (Daniel, 1997, Muniz et al., 2001). The Wechsler Scales measure both fluid intelligence ( $G_f$ ), applying reasoning skills to novel situations, and crystallized intelligence ( $G_c$ ), reasoning that involves a culturally specific component, and therefore is culturally bound (Searle, 2003). In fact, fluid intelligence has been found to have a near perfect correlation to  $g$  and so it can be said that fluid intelligence is general intelligence (Jensen, 1998). Any intelligence test that is culturally bound needs to be administered specifically to individuals from the culture that the test was designed for otherwise those from other cultures will have reduced scores. There are tests, such as Raven’s Progressive Matrices (1965) that claim to be free from cultural constraints. However, there are problems with such tests and according to Searle (2003) the evidence that Raven’s Progressive Matrices is culturally free is limited. The Wechsler Abbreviated Scale of Intelligence (WASI) in this study was therefore administered only to those people whose first language was English and who are from the same culture.

It was decided to use the WASI as a brief scale of intelligence since a substantial amount of time was already required of the participants and it was felt that

completion of the WAIS-III (The Psychological Corporation, 1999), with an estimated administration time of 75 minutes, would discourage participation in the study. Also an estimation of general intellectual functioning is sufficient for this study since it is not being used to diagnose participants or determine placement of them in work settings. Moreover, The Psychological Corporation (1999) considers the WASI to be an appropriate measure for the estimation of general intellectual functioning for research purposes.

The Psychological Corporation (1999), from their studies measuring content, convergent and discriminant validity, conclude that there is evidence for the WASI being a valid quick screening measure of general intellectual functioning. In fact, some researchers believe that brief tests, such as the WASI, should be used in favour of short forms of intelligence tests since the WASI and other brief tests are reliable, valid, well normed and easy to give and score (Kaufman & Kaufman, 2001). Moreover, evidence for good concurrent, construct, convergent and discriminant validity has been found by other investigators for the WASI (Hays et al., 2002, Ryan et al., 2003).

Thus the WASI appears to demonstrate good validity and is easy and quick to administer and score. Therefore it was selected as the most appropriate measure, given the resources available, to use in this project as a method of estimating general intelligence of the “artists”.

There is both a four-subset and a two-subset format of the WASI with the former taking approximately 30 minutes to administer and the later approximately 15

minutes. The two-subset format will produce only a Full Scale IQ whereas the four-subset format yields a Verbal IQ (VIQ), a Performance IQ (PIQ), and a Full Scale IQ (FSIQ). The verbal scale consists of vocabulary and similarities subsets and the performance scale is made up of block design and matrix reasoning subsets.

Each of the subsets measures different facets of intelligence. The vocabulary subset measures the individual's expressive vocabulary, verbal knowledge, fund of information, crystallised intelligence and *g* (The Psychological Corporation, 1999). Similarities is a measure of verbal concept formation, abstract verbal reasoning ability, and general intellectual ability. Block design focuses on the abilities of spatial visualisation, visual-motor coordination, and abstract conceptualisation and is a measure of perceptual organisation and *g*. The final subset, matrix reasoning is a measure of nonverbal fluid reasoning and general intellectual ability (The Psychological Corporation, 1999). Thus, the four-subset format was used in this study so that a measure of VIQ and PIQ as well as FSIQ could be gained for each "artist". Furthermore, it was decided that the four-subset format would be used since its internal consistency reliability coefficients for FSIQ (.98), its stability coefficients for FSIQ (.93), and its FSIQ correlation with that of the WAIS-III (.92) were all greater than for the two-subset format (The Psychological Corporation, 1999).

#### **6.4. THE PILOT STUDY**

Once the 12 artworks had been made and the “artists” measured on intelligence and personality, a questionnaire was constructed, and piloted, that was designed to rate the artworks and the “artists” on a number of variables (Appendix 10).

Seven people piloted the questionnaire using the actual artworks for the study. These individuals had not made any of the artworks and would not be rating the products in the actual study. They timed how long the questionnaire took to complete and provided verbal feedback. Their responses on the questionnaire also indicated whether there had been any misunderstandings or ambiguity over questions. Changes were made as common themes arose and feedback gained for these alterations. It was found that after feedback from the first five individuals the major problems had been addressed and further comments were due to individual preferences rather than fundamental problems with the questionnaire and so the pilot study was stopped after seven participants.

Through the feedback from the pilot study it was decided to state the constraints and conditions that the “artists” had been placed under. This was felt to help the raters make a realistic judgement regarding variables such as the creativity of the artwork. They were also told to rate each piece by comparing it to the others since this helped to clarify the standard of creativity and did not mean that participants were each using their own baselines for a definition of a creative work, which could have varied considerably.

## **6.5. THE QUESTIONNAIRE**

Initially, participants were asked to rate the artworks on the three variables creativity, attractiveness, and interest using a scale where 1 is least creative/attractive/interesting and 10 is most creative/attractive/interesting (Appendix 10).

### **6.5.1. Creativity of Artwork**

Since creativity has been found to be a desired quality in a potential sexual partner (Buss & Barnes, 1986, Hester & Rudolph, 1994, Li et al., 2002) and Miller (2001) states that this is one of the qualities of the artist that can be assessed through the artwork then this was included in the questionnaire to identify whether raters were using this as an indication of any of the qualities of the artist.

Furthermore, rating the artworks on creativity should allow a test of the creativity continuum since overall scores by the raters can be compared to the scores on the creativity continuum given by the “artists”. This will identify whether there appears to be any correlation between self-rated creative ability and actual creative production.

### **6.5.2. Attractiveness of Artwork**

Miller (2001) claims that it is through the aesthetic judgement of the artwork that the raters are able to identify the qualities of the “artist”. Therefore by asking the raters to judge the artworks attractiveness and the various qualities of the artist then it can be investigated as to whether this is the case.



Moreover, identifying the perceived attractiveness of the artwork and how, in later questions, attractive the “artist” is may indicate whether aesthetic judgement of the artwork influences the imagined appeal of the “artist”. Interestingly, Murphy & Hellkamp (1976) found that when paintings were paired with a picture and a tape recording of a female which varied on attractiveness and warmth both male and female observers rated the paintings of the attractive artists significantly higher than those of the unattractive artists and also the greater the warmth conveyed by the artist the higher the painting was rated. They therefore concluded that the less information a person has about an artist the more objective they will be in rating the artwork (Murphy & Hellkamp, 1976). However, it is also possible that if they do not have direct evidence of personality and attractiveness of an artist then they will look for it in the artwork. In studies investigating observers’ impressions of people’s personalities from viewing their bedrooms and offices (Gosling et al., 2002) and personal websites (Vazire & Gosling, 2004) it has been shown that observers are able to assess personality through these extended phenotypes with a relatively high degree of accuracy.

Similar to these studies but using creative products, although not considering a wide range of personality characteristics, Hagen & Bryant (2002) asked participants to rate 3 pieces of music that varied in quality and to judge, among other things, how nice the participants thought the musicians were based solely on the music that they heard. They found a significant positive correlation between how nice the musicians were believed to be and how skilled they were considered to be ( $r = 0.35$ ,  $p < 0.001$ ) (Hagen & Bryant, 2002). Furthermore,

Hagen & Bryant (2002) calculated a composite music quality score from the questions asked and this was also found to be significantly correlated with the “niceness” of the musicians ( $r = 0.23$ ,  $p < 0.002$ ). Thus, it appears that the pleasantness of the music was projected onto the musicians’ personalities.

### **6.5.3. Interestingness of Artwork**

The artwork was also rated on how interesting it was perceived to be. Heinrichs & Cupchik (1985) defined such a rating as tapping into the observers’ objective preference as opposed to their subjective pleasure-based preference. Thus the skill of the composition and style are assessed by this measure rather than the emotional power of the artwork (Heinrichs & Cupchik, 1985). However, interest may also be related to the creativity of the artwork in terms of originality since the more original a piece of art the more it may hold a person’s attention. Furthermore, interestingness may be related to intelligence, which is the attribute of the artist that Miller particularly emphasises as being desired by potential mates.

It is of course a limitation that the terms used in the questionnaire are to some extent reliant on the observers’ subjective interpretation. However an analysis of the degree of observer consensus in the ratings on this scale may provide some information on whether there is a common understanding of the term interest since high observer consensus would suggest a widespread interpretation of “interesting”.

#### **6.5.4. Communicative Ability of Artwork**

Once the participants had rated the artworks on degree of attractiveness, interest and creativity they then were asked what emotions they thought each “artist” was communicating and if the artworks was also communicating anything else other than emotional content (Appendix 10). These questions were an extension of the “Definitions of Creativity Study” where there was a strong consensus that creative products are communicating something. From the responses to this question it can be seen whether there is a consensus between the raters and whether their interpretations reflect the “artists” attempts to communicate something about themselves through their artwork

#### **6.5.5. Characteristics of the “Artists”**

The following nine questions encourage the raters to consider what the qualities of the “artists” were. Therefore they are asked to rate the “artists” on a scale from 1 to 10 (10 being the most attractive, creative, etc) on how creative, intelligent, interesting, physically attractive, emotionally sensitive, physically skilled, outgoing, conscientious, and friendly they are (Appendix 10). Miller (2001) states that a creative product should be an indicator of creativity, intelligence, personality and dexterity (physically skilled). Therefore these questions were asked to test these claims. The ratings for these variables can be compared to the “artists” actual scores to assess whether raters can accurately assess the qualities of the “artists” through the artwork. This is fundamental to the fitness indicator theory since if raters are inaccurate in their assessments then artworks are poor fitness indicators.

The terms used to assess the personality traits of the “artists” reflected the Five Factor model so that they could be assessed for accuracy against the “artists” ratings on the personality scale. Thus, raters were asked to measure the “artists” on creativity which would reflect openness, emotional sensitivity which would mirror neuroticism, how outgoing they are which would reflect extraversion, and friendliness which is associated with agreeableness. It was felt that there was not another term that would capture conscientiousness as well as the term itself and so participants were asked directly about this. It is probable that the artwork will provide good clues to some personality traits but not such good indications of others as has been found in previous research on other extended phenotypes (Gosling et al, 2002). This can be considered by comparing the raters’ scores with the actual personality scores of the “artists”.

It may also be that the “artists” are enhancing certain personality characteristics and masking others or that they are projecting their ideal self. This can be partly surmised by considering whether there is a high observer consensus on some traits, which could be interpreted as more positive but are not apparent in the personality score of the “artist”.

“Artists” were also rated on physical attractiveness to identify whether the attractiveness of the artwork was projected onto the image of the “artist”. The reverse of this was done in the study by Murphy & Hellkamp (1976) as discussed above. If the more attractive artworks were believed to have been made by more attractive “artists” then this would suggest that artworks could be used to attract mates.

The raters were then asked to choose which one of the “artists” they would most like to go out on a date with and why. If there is a consensus as to the most desirable “artist” to go out on a date with then this would lend support for the sexual selection hypothesis since these two “artists” work (one male artwork and one female artwork) would appear to be clearly signalling something which made them particularly attractive to the participants. However, it is also possible that raters are looking for different things in a date thus there may not be one overall “winner” for both the male and female “artists”. Therefore, it needs to be clear that “artists” are being chosen above chance level on this question. The responses as to why a rater chose a particular “artist” should help to clarify whether participants are just responding randomly or whether there are specific reasons for choosing a particular artist such as level of intelligence, particular personality traits, etc.

#### **6.5.6. Demographic Questions**

Finally, the raters were asked some questions about themselves (Appendix 10). Although they were rating the products according to their sex participants were asked for this information to check that they had in fact rated the appropriate artworks. They were also asked for their age to identify if there are any effects of age on the judgement of the artworks and products and because younger individuals are more likely to be looking for a partner and so may be more open to interpreting artworks on this basis. Furthermore, they were asked about relationship status, if they had children, and whether they are currently looking for a partner and if so whether they want a long or short term partner since this

may again influence how open they are to using the artworks as fitness indicators.

Their occupational status and level of income may indicate whether they could require longer term resources from a partner or are able to support themselves and therefore may be more interested in “good genes” regardless of resource potential. The responses to ethnic origin will indicate whether there are possible cultural differences to responses.

Participants were also asked to indicate their level of interest over the past 12 months in a number of activities (Appendix 10). Thus it can be identified as to whether those raters with particular interests rated the “artists” and the artwork differently. It may also provide some indication as to how open to experience the raters are since it has been found that those with a large number of varied interests are more open to experience (McCrae & Costa, 1997).

Finally participants were asked to rate themselves on the creativity continuum to identify whether there is a relationship between their self-rated creativity and their ratings of the artworks and the “artists”.

The questionnaire took approximately 30 minutes to complete. There was a covering letter, which explained what to do, consent, anonymity, withdrawal from the study, and where a summary of the results would be available (Appendix 10). On completion of the questionnaire participants placed it in an

envelope that they sealed and placed in a box provided. This helped to insure anonymity and confidentiality.

#### **6.6. THE RATERS**

The study was conducted at a University in the North of England primarily using undergraduate psychology students who were provided with course credits for participation. The study ran over two days. It was advertised through posters and by the tutors verbally informing their students. Furthermore, there was also a pool of people interested in participating in research that were also given the opportunity to participate in the experiment.

The experiment was set up in an empty room with no windows and so there were no distractions present. Due to the psychology department criteria for undergraduates gaining course credits through participating in experiments the participants were asked to sign a consent form (Appendix 11) and were provided with a debrief sheet (Appendix 12) at the end of the study informing them of the aims of the study in more detail.

# **CHAPTER 7**

## **FITNESS INDICATOR STUDY**

### **DATA ANALYSIS**

Due to problems with recruitment of male participants the number of males recruited as raters (11) means that their results could not be generalised to a wider population or said to be reliable. Therefore, the results from the female raters and male “artists” only will be considered within this thesis since the higher number of female raters can be said to provide more valid results. However, the results for the male raters and female “artists” are available on request.

#### **7.1. THE MALE “ARTISTS”**

##### **7.1.1. DEMOGRAPHICS**

None of the “artists” in this study were professional artists and the majority did not engage in any artistic activities at all. There were six male “artists” for whom only minimal demographic data was collected. All the “artists” were from the same ethnic background, white British. The age of the male “artists” ranged from 25 to 57 years with a mean of 43.33 years. All “artists” worked at a University in the South of England. None of them were academics apart from one who was a PhD research student.



Since there are only 6 “artists” this is a very small sample size and so the results of the creativity continuum, intelligence test and personality scale cannot be generalised to a wider population. Furthermore, any statistics, such as correlations, may be a product of the sample, with all the possible biases that may be present within it. However, it is relevant to this study to consider the relationship between the variables, such as the correlations between IQ, personality and creativity continuum scores, to gain an understanding of the characteristics of the “artists”.

**7.1.2. CREATIVITY CONTINUUM SCORES**

The “artists” were chosen so that they represented a range of scores on the creativity continuum (Table 22).

**Table 22. Scores on the Creativity Continuum Mean Score for Male “Artists”**

“Artist” Number	Creativity Continuum Mean Score
1	3.40
2	1.08
3	2.40
4	2.10
5	3.00
6	1.63

Age of the “artists” was found to be strongly, significantly correlated with the creativity continuum mean scores ( $\rho = 0.812$ ,  $p = 0.050$ ). Therefore, the older the “artist” is the less creative they rate themselves as being. This may be because there is some evidence that creative production usually peaks in the person’s 20s and 30s and that parenting and marriage can inhibit creative output (Kanazawa, 2000, Miller, 1999). Although Miller (1999) predicts a curvilinear relationship this would not be expected to be seen within this sample since the

youngest “artists” was 25 which is at the point when creative output should peak. However, this result is somewhat surprising since there was found to be no relationship between age and creativity continuum scores in the Definitions of Creativity study (Chapter 5) and may therefore be a product of the small sample size.

Since openness has been found in other studies to correlate with creativity (Costa et al., 1984, Dollinger & Clancy, 1993, Dollinger et al., 2004, Feist, 1998, Furnham, 1999, Furnham & Chamorro-Premuzic, 2004, McCrae, 1987, McCrae & Costa, 1997, Nowakowska et al., 2004, Walker et al., 1995) and artists have been found to be high in this personality trait (McCrae & Costa, 1997) then it would be expected that the creativity continuum would be correlated with the “artists” openness to experience scores although this was in fact not the case ( $\rho = -0.058$ ,  $p = 0.913$ ). What does emerge for the male “artists” is the strong, significant correlation between similarities T scores ( $\rho = 0.853$ ,  $p = 0.031$ ), matrix reasoning T scores ( $\rho = 0.943$ ,  $p = 0.005$ ) and Full Scale IQ scores (FSIQ) ( $\rho = 0.829$ ,  $p = 0.042$ ) with creativity continuum mean scores. Thus, for the male “artists” openness does not appear to play a significant role in their perceptions of themselves as creative, rather it is their level of intelligence so that the more intelligent they are the lower they rate their creative ability as measured by the creativity continuum. It may be that less intelligent men compensate by focusing on their more creative side. However, it must be remembered that none of the sample were below average intelligence (Table 23) and in fact the range was FSIQ 110-136 which according to The Psychological Corporation (1999) is high average to very superior.

### 7.1.3. INTELLIGENCE SCORES

Since the “artists” intelligence scores are all very close (Table 23) this may make it difficult to distinguish individual “artists” as to how intelligent they appear in relation to the other artists.

**Table 23. Male “Artists” Intelligence Scores as Measured by the WASI**

Artist Number	Vocab Score	Simil Score	VIQ	Block Design Score	Matrix Score	PIQ	FSIQ
1	70.00	67.00	133.00	64.00	69.00	129.00	136.00
2	53.00	59.00	109.00	56.00	56.00	109.00	110.00
3	66.00	61.00	122.00	69.00	68.00	134.00	132.00
4	66.00	64.00	126.00	72.00	66.00	135.00	134.00
5	70.00	64.00	130.00	64.00	67.00	128.00	133.00
6	70.00	61.00	127.00	56.00	60.00	112.00	123.00

When the correlations between the subsets and FSIQ were computed for the male “artists” the majority were non-significant and only one subset, similarities, significantly correlated with FSIQ (Table 24). This is not what would be expected and is likely to be due to the very small number of “artists”. In fact a number of the correlations are actually strong, such as the FSIQ and verbal IQ, but non-significant.

**Table 24. Spearman's Rho Correlations between the subtests and FSIQ for the male "artists".**

	Vocab T score	Simi T Score	VIQ	Block T Score	Matrix T Score	PIQ	FSIQ
Vocab T score	1						
Simi T Score	$\rho = .636$ $p = .175$	1					
VIQ	$\rho = .926$ $p = .008$	$\rho = .853$ $p = .031$	1				
Block T Score	$\rho = -.127$ $p = .810$	$\rho = .485$ $p = .330$	$\rho = .029$ $p = .956$	1			
Matrix T Score	$\rho = .463$ $p = .355$	$\rho = .736$ $p = .096$	$\rho = .600$ $p = .208$	$\rho = .530$ $p = .280$	1		
PIQ	$\rho = .000$ $p = 1.000$	$\rho = .559$ $p = .249$	$\rho = .143$ $p = .787$	$\rho = .971$ $p = .001$	$\rho = .600$ $p = .208$	1	
FSIQ	$\rho = .463$ $p = .355$	$\rho = .971$ $p = .001$	$\rho = .714$ $p = .111$	$\rho = .647$ $p = .165$	$\rho = .771$ $p = .072$	$\rho = .714$ $p = .111$	1

Vocab = vocabulary, Simi = similarities, VIQ = verbal IQ, block = Block design, Matrix = matrix reasoning, PIQ = Performance IQ, and FSIQ = Full Scale-4 IQ. N = 6

There was only one personality trait that was significantly correlated with the male "artists'" scores on the WASI, which was conscientiousness (Table 25). Contrary to previous research (see (Ackerman & Heggestad, 1997, Austin et al., 2002, Bates & Shieles, 2003, Holland et al., 1995, Moutafi et al., 2003) openness was not significantly correlated with intelligence as would have been expected. This may be a product of the sample.

**Table 25. Spearman's Rho Correlations between Personality and Intelligence Scores for Male "Artists".**

	Vocab T score	Simi T Score	VIQ	Block T Score	Matrix T Score	PIQ	FSIQ
Neurot	$\rho = .617$ $p = .192$	$\rho = .412$ $p = .417$	$\rho = .543$ $p = .266$	$\rho = .029$ $p = .956$	$\rho = .257$ $p = .623$	$\rho = .257$ $p = .623$	$\rho = .371$ $p = .468$
Extrav	$\rho = -.062$ $p = .908$	$\rho = -.530$ $p = .280$	$\rho = -.257$ $p = .623$	$\rho = -.500$ $p = .312$	$\rho = -.543$ $p = .266$	$\rho = -.657$ $p = .156$	$\rho = -.657$ $p = .156$
Open	$\rho = .219$ $p = .676$	$\rho = .194$ $p = .713$	$\rho = .348$ $p = .499$	$\rho = -.537$ $p = .272$	$\rho = -.116$ $p = .827$	$\rho = -.406$ $p = .425$	$\rho = .116$ $p = .827$
Agree	$\rho = -.370$ $p = .470$	$\rho = .265$ $p = .612$	$\rho = -.029$ $p = .957$	$\rho = .147$ $p = .781$	$\rho = .257$ $p = .623$	$\rho = .143$ $p = .787$	$\rho = .371$ $p = .468$
Conscie	$\rho = -.861$ $p = .028$	$\rho = -.567$ $p = .240$	$\rho = -.812$ $p = .050$	$\rho = .104$ $p = .844$	$\rho = -.638$ $p = .173$	$\rho = -.087$ $p = .870$	$\rho = -.464$ $p = .354$

Vocab = vocabulary, Simi = similarities, VIQ = verbal IQ, block = Block design, Matrix = matrix reasoning, PIQ = Performance IQ, and FSIQ = Full Scale-4 IQ, Neurot = neuroticism, Extrav = extraversion, Open = openness, Agree = agreeableness, Conscie = conscientiousness. N= 6.

Conscientiousness was found to have a moderate, significant relationship with some of the WASI scores. In fact, the significant correlations are negative so that the more intelligent the participant was the less conscientious they were. This supports results from Moutafi et al's (2003) study. They propose that such a negative correlation suggests that those lower in intelligence need to be more conscientious to enable them to succeed or get through life. However, it is with the Verbal IQ components that there is a significant, negative relationship with conscientiousness (Table 25). This is contrary to Moutafi et al's (2004) results, which found that conscientiousness was significantly negatively correlated with Gf but not with Gc (although the relationship was also negative), since VIQ and its sub-components are likely to have a stronger Gc element than PIQ and its sub-components (although Gf also forms a large component of VIQ). They go on to suggest that those individuals high on conscientiousness would compensate for

their lower Gf by increasing their Gc through hard work particularly during their education (Moutafi et al., 2004). The male “artists” in this sample do not appear to support this hypothesis since those higher in conscientiousness do not appear to be focused on increasing their cultural knowledge.

**7.1.4. PERSONALITY SCORES**

The individual scores for the “artists” on each of the personality domains can be seen in Table 26.

**Table 26. Male “Artists” Scores for the Five Personality Domains**

Artists Number	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
1	80.00	48.00	92.00	86.00	49.00
2	35.00	93.00	90.00	83.00	69.00
3	43.00	57.00	73.00	74.00	65.00
4	58.00	51.00	89.00	77.00	68.00
5	37.00	99.00	79.00	71.00	65.00
6	95.00	77.00	90.00	56.00	51.00

There were no significant correlations between different personality scores for these “artists”. For each of the personality traits there was a minimum possible score of 20 and a maximum score of 100. For comparison norms from a general population of internet users from data from Nettle (unpublished data) were used (Table 27). However, these norms are from the 50 item version of Goldberg’s Five Factor Model and therefore have been doubled for comparison with the 100 item questionnaire used in this study. Therefore, it is important to note that these norms provide only a very rough guide for comparison with the personality data from the “artists”.

**Table 27. Five Factor Personality Norms for Males**

Personality Trait	Low Score	Medium Low Score	Medium High Score	High Score
Neuroticism	20-46	47-58	59-72	73-100
Extraversion	20-46	47-62	63-74	75-100
Openness	20-76	77-82	83-90	91-100
Agreeableness	20-66	67-74	75-84	85-100
Conscientiousness	20-60	61-70	71-80	81-100

The artist's scores for neuroticism ranged from 35 to 95 with a mean of 58.00 and a SD of 24.69. For extraversion the range was 48 to 99 with a mean of 70.83 and a SD of 22.04, for openness the range was 73 to 92 with a mean of 85.50 and a SD of 7.66, and for agreeableness the range was 56 to 86 with a mean of 74.50 and a SD of 10.63. Finally the range of scores for conscientiousness was 49 to 69 with a mean of 61.67 and a SD of 8.82. The number of "artists" having low, medium low, medium high and high scores can be seen in Table 28.

**Table 28. Levels of Personality Traits for the Male "Artists".**

	Number of Low Scorers	Number of Medium Low Scorers	Number of Medium High Scorers	Number of High Scorers
Neuroticism	3	1	0	2
Extraversion	0	3	0	3
Openness	1	1	3	1
Agreeableness	1	2	2	1
Conscientiousness	2	4	0	0

Thus, broadly summarising the male "artists" appear to be on average lower in neuroticism, higher in openness, lower in conscientiousness and fairly evenly spread on extraversion and agreeableness. The skew for neuroticism and openness may be due to the types of individuals prepared to participate in a study

on creativity. Thus, those higher in openness may be more curious and interested in creativity and those lower in neuroticism may be more prepared to try something different without feeling too anxious. The bias towards those lower in conscientiousness is more difficult to explain but may be due to the relationship between conscientiousness and creativity which has found creative individuals significantly lower on conscientiousness (Chapter 2). Since more creative individuals may be more interested in participating in this study then this may explain the skew for conscientiousness scores.

## **7.2. THE FEMALE RATERS**

### **7.2.1. DEMOGRAPHICS**

All the raters came from an undergraduate population at a University in the North of England. There were 51 female raters.

The majority (90%) were aged 18 to 19 years old with a range of 15 to 40 years and a mean of 18.9 years. The female raters primarily identified themselves as white British (86%) with other ethnic origins being Chinese (2%), white & Asian (4%), other Asian (2%), other mixed (4%), and other white (2%). Thus, the results are only generalisable to a white British population and differences in ethnic origin should not influence the results.

There were 65% who were single, 29% were in a long-term relationship, 4% were married, and 2% were in a short-term relationship. Of those who were single 70% were looking for a partner and of these 56% were looking for a short-



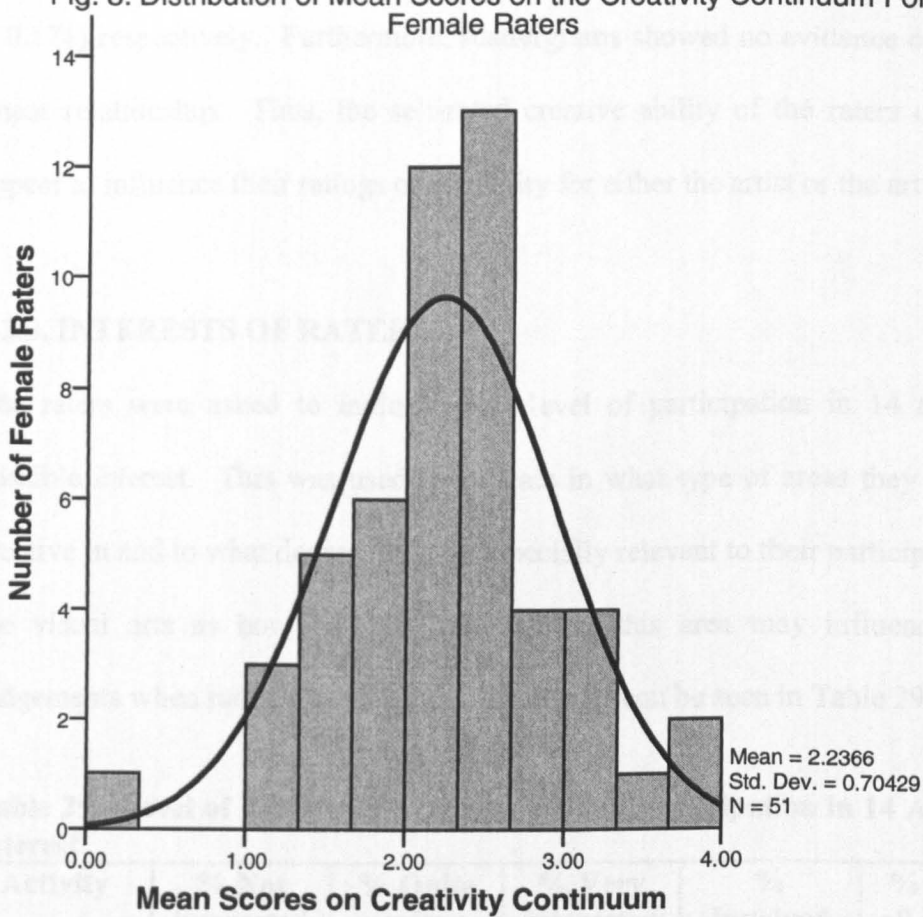
term partner and 44% were looking for a long-term partner. Only 2 of the 51 raters had children. Therefore, this sample may be particularly open to receiving signals from fitness indicators as the majority are at an age and in a position to be looking for sexual partners.

All raters were students with the majority (96%) being undergraduate psychology students. One student was studying fine art and another was studying languages and linguistics. Therefore, unsurprisingly most of the female participants (91%) had an income below £15,000. Thus, variation in occupational status and income will not have a significant affect on the participants' ratings.

#### **7.2.2. CREATIVITY CONTINUUM SCORES**

The mean creativity continuum scores for the female raters are shown to approximate a normal distribution (Fig. 8).

Fig. 8. Distribution of Mean Scores on the Creativity Continuum For Female Raters



This supports the findings in the “Definitions of Creativity Study” that found that the creativity continuum mean scores were normally distributed in the general population. Therefore, these participants can be said to equate to a normal population in self-rated creative ability. This is important for this study since it is trying to understand perceptions of art from people who range in creative ability and not just experts or those who have a special interest in the art world since if the sexual selection hypothesis is applicable to art then art products need to “speak” to all individuals.

Consideration of the relationship between the raters’ creativity continuum scores and their ratings for the creativity of the artwork and creativity of the artist

demonstrated no significant correlations ( $p = 0.015$ ,  $p = 0.805$ ) and ( $p = 0.032$ ,  $p = 0.571$ ) respectively. Furthermore, scattergrams showed no evidence of a non-linear relationship. Thus, the self-rated creative ability of the raters does not appear to influence their ratings of creativity for either the artist or the artwork.

### 7.2.3. INTERESTS OF RATERS

The raters were asked to indicate their level of participation in 14 areas of possible interest. This was used to indicate in what type of areas they may be creative in and to what degree. This is especially relevant to their participation in the visual arts as how involved they are in this area may influence their judgements when rating the artworks. The results can be seen in Table 29.

**Table 29. Level of Female Raters' Interest and Participation in 14 Areas of Interest**

Activity	% Not interested	% Quite enjoy	% Very interested	% Involved in production of	% Make all or part of living from
Sport	9.8	49.0	11.8	27.5	2.0
Cinema	2.0	27.5	54.9	15.7	0.0
Television	0.0	31.4	56.9	11.8	0.0
Theatre	23.5	51.0	13.7	11.8	0.0
Mathematics	72.5	13.7	3.9	7.8	2.0
Music	2.0	13.7	49.0	31.4	3.9
Dance	15.7	43.1	17.6	19.6	3.9
Novels & Stories	5.9	45.1	37.3	9.8	2.0
Poetry	64.7	27.5	5.9	2.0	0.0
Science	41.2	35.3	13.7	7.8	2.0
Politics	60.8	31.4	7.8	0.0	0.0
Religion	54.9	23.5	11.8	5.9	3.9
Crafts	62.7	15.7	7.8	11.8	2.0
Visual Arts	49.0	29.4	7.8	9.8	3.9

What is of particular interest for this study is that fewer than half the raters were interested in visual art. This would suggest that they may have a limited experience of viewing visual art and so may be less influenced by art knowledge when judging the artworks on certain variables such as creativity and attractiveness. Furthermore, over half the number of participants were not interested in craft activities, which is another variable that could influence ratings of artwork since the artworks were produced from craft materials. In fact, using the Kruskal-Wallis test, and dividing the level of interests into not interested, passive interest and active interest (see Chapter 5), it was found that there was no significant effect of level of interest in visual arts on ratings of how creative the artwork is ( $\chi^2 = 0.830$ ,  $df = 2$ ,  $p = 0.660$ ) and how creative the artist is ( $\chi^2 = 0.408$ ,  $df = 2$ ,  $p = 0.816$ ) and no significant effect of level of interest in crafts on how creative the artwork is ( $\chi^2 = 0.655$ ,  $df = 2$ ,  $p = 0.721$ ) and how creative the artist is ( $\chi^2 = 0.224$ ,  $df = 2$ ,  $p = 0.894$ ). Thus there is no significant difference between the ratings of creativity regardless of how involved the raters are in either visual arts or crafts.

### **7.3. RATINGS OF THE ARTWORKS**

Appendix 13 shows the artworks that were made by the “artists”. The artwork was rated on three criteria; attractiveness, interestingness, and creativity. Since the ratings were not normally distributed non-parametric correlations were computed. The ratings for the three variables were significantly and moderately to strongly correlated with each other (Table 30). They continue to be significant

even when the Bonnfiferoni test for multiple ratings is applied which adjusts the significance level to 0.02.

**Table 30. Correlations Between the Ratings of the Artworks on the Variables Attractiveness, Interest and Creativity.**

		artwork attractive	artwork interesting	artwork creative
artwork attractive	Spearman's Rho	1	.635(**)	.612(**)
	Correlation			
	Sig. (2-tailed)	.	.000	.000
	N	300	288	288
artwork interesting	Spearman's Rho	.635(**)	1	.798(**)
	Correlation			
	Sig. (2-tailed)	.000	.	.000
	N	288	288	288
artwork creative	Spearman's Rho	.612(**)	.798(**)	1
	Correlation			
	Sig. (2-tailed)	.000	.000	.
	N	288	288	288

**\*\*** Correlation is significant at the 0.01 level (2-tailed).

Therefore, the greater the artwork was judged to be on one of these variables the greater it was rated on the other two variables. This suggests that attractiveness and level of interest are associated with creativity.

Since it was relevant to identify to what degree the ratings for the attractiveness and interest of the artwork predicted scores for the creativity of the artwork, and the data was judged to be robust enough for parametric statistics, a multiple regression was conducted. A significant model emerged ( $F_{2,285} = 284.244$ ,  $p < 0.01$ ). Together ratings for attractiveness and interest of the artworks accounted for 66% of the variance in ratings of creativity (Adjusted  $R^2 = 0.664$ ). Interest scores were a stronger predictor of creativity scores than attractiveness

scores (Interest –  $\beta = 0.674$ ,  $t = 15.066$ ,  $p < 0.01$ ) (Attractiveness –  $\beta = 0.198$ ,  $t = 4.434$ ,  $p < 0.01$ ) although both were significantly related to creativity scores for the artworks.

When ratings of attractiveness becomes the dependent variable the model is again significant ( $F_{2,285} = 117.793$ ,  $p < 0.01$ ). However, only 45% of the variance was accounted for by ratings of creativity and interest (Adjusted  $R^2 = 0.449$ ) which suggests that other variables account for a significant proportion of the variance in attractiveness scores. Furthermore, the contribution of the two predictor variables are similar (Interest –  $\beta = .383$ ,  $t = 5.224$ ,  $p < 0.01$ ) (Creativity –  $\beta = .325$ ,  $t = 4.434$ ,  $p < 0.01$ ).

Finally, when ratings for interest became the dependent variable the predictor variables accounted for 67% of the variance (Adjusted  $R^2 = 0.672$ ). The model was significant ( $F_{2,285} = 294.936$ ,  $p < 0.01$ ). Ratings of creativity was the strongest predictor of interest scores (Creativity –  $\beta = .658$ ,  $t = 15.066$ ,  $p < 0.01$ ) although attractiveness also contributed significantly (Attractiveness –  $\beta = .228$ ,  $t = 5.224$ ,  $p < 0.01$ ).

Thus it can be seen that creativity and interest are most strongly predictive of each other. Level of interest may be linked with the degree of originality, novelty and degree of stimulation all of which have been associated with creativity (Amabile, 1983, Besemer & O'Quin, 1986, Feist, 2001, Simonton, 1999). Nevertheless, there needs to be a balance between the level of arousal in an artwork as too little will be considered boring and too much may stimulate

anxiety and hostility (Simonton, 1999). Therefore, it could be assumed that the better the balance in arousal level the more interesting an artwork is considered to be and thus, from these results, the more creative it will be rated.

However, attractiveness and creativity also influence each other. This may therefore be associated with the aesthetic view of art. Furthermore, the level of novelty and mystery may influence the degree of perceived attractiveness of an artwork (Thornhill, 1998) and so this may explain the relationship found between interest and attractiveness.

### **7.3.1. WHAT IS THE ARTWORK COMMUNICATING?**

Since, from the Definitions of Creativity Study the majority of participants considered that a creative product communicates ideas and emotions or reflects something of the creator, the raters in this study were asked what emotions the “artists” were trying to communicate and what the artwork was communicating about the “artists”. However, a consideration of the responses indicated that in general the raters did not clearly distinguish between the two questions and so the responses to these questions were grouped together.

**Table 31. Comparison of Qualitative Data for What the Artwork is Communicating about the Artists with Actual scores of Artists.**

Artwork Number	Commonly Mentioned Traits of Artist (% of participants who mentioned trait)	Suggested Level of Actual Trait	Actual scores of Artists
1	Creative (22%)  Negative emotions (e.g. alone/ tangled emotions) (31%)	High openness  High neuroticism and/or Low extraversion	Openness 92/100 (high)  Neuroticism 80/100 (high) Extraversion 48/100 (medium low)
2	Fun (55%) Outgoing/Extraverted (24%) Happy (77%)	High extraversion	Extraversion 93/100 (high)
3	Calm/laid back (55%)  Simple/uncomplicated (24%)	Low neuroticism  Low openness	Neuroticism 43/100 (low)  Openness 73/100 (low)
4	Complex/ thoughtful (28%) Creative (22%)	High openness	Openness 89/100 (medium high)
5	Fun (28%)  Calm (24%)	High extraversion  Low neuroticism	Extraversion 99/100 (high)  Neuroticism 37/100 (low)
6	Anxious/bored (24%)  Loner/Introverted (28%)	High neuroticism  Low extraversion	Neuroticism 95/100 (high)  *Extraversion 77/100 (high)

Note: All responses suggested by 20% or more of raters were included that could be clearly correlated with the Five Factor Model as defined by (McCrae & Costa, 1987). Levels of personality traits as defined by norms (Table 27). \* Responses by raters are inaccurate.



### 7.3.1.1. Artwork 1

“Artist” number 1’s statement as to what the artwork is expressing along with the raters’ interpretations can be viewed in Appendix 14. Probably the most striking aspect is the frequency of the term trapped along with other terms such as entrapment, captivity, enclosed, confined, and failing to escape which were considered to encapsulate the same concept. In fact, 59% of raters felt that the artwork was expressing the “artist’s” feelings of being trapped. Although the “artist” does use the word “cage” to describe the structure he does not imply that he is trying to express a sense of entrapment through his artwork. However, a number of raters have also suggested that the “artist” has also expressed a conflicting feeling of freedom or beauty. Furthermore, raters appear to be divided in their interpretation of some of the emotions evoked by the artwork with 31% mentioning some form of negative emotion or state (alone/ sadness/ confusion/ tangled emotions/ lost/unhappy/ helplessness/ frustration/ sad/ isolated/ humiliation) and 16% picking up on more positive emotions or states (peace/ calm/ harmony/ easy going/ relaxation/ balance). This may demonstrate some accuracy since the “artist” states that part of the artwork expresses two opposing sides within him.

However, the “artist” also implies that there is some mystery within the artwork and that he has expressed his reflective side and that there is a suggestion of a spark of something. The first two aspects were only identified by one and two raters respectively and the third aspect was not identified at all. These features were probably too subtle for observers to interpret, particularly in a piece of abstract artwork such as this one.

Finally for artwork 1, 22% of the raters mentioned the term creative or related terms. This is in contrast to the “artist’s” belief that he was relatively uncreative when rating himself on the creativity continuum (score of 3.40 – Table 22) and so does not reflect his belief about his creative abilities. However, when considering how creative something is the opinions of the individuals looking at the art may be as, if not more, important than the belief of the artist himself. This position is reflected in the findings of the Definitions of Creativity study (Chapter 5) which found that the people who use/ view the creative product were believed to be the most important judges of creative products. Furthermore, since this artist had a very high score on openness to experience (score 92/100, Table 26) this suggests that he has a propensity to creativity but that possibly due to other cognitive factors, such as lack of motivation or poor self-esteem, he tends not to engage in creative activities and therefore he believes his creative ability to be low. However, when placed in a situation where he is required to be creative he is able to demonstrate a relatively high degree of ability compared to other non-artists.

Interestingly, from Table 31 it appears that there is some degree of accuracy by the raters as to what the artwork is communicating compared to the actual scores of “artist” 1.

#### **7.3.1.2. Artwork 2**

Artwork 2 produced strong agreement between raters as to the emotions and personality of the “artist” (Appendix 14) and these reactions appear to be

accurate (Table 31). Happiness (happy/ jolly/ laughter/ joy/ content/ cheerful) was the most commonly proposed emotion by 77% of the raters. Furthermore, the terms fun/ humour/ playful/ light hearted/ comic, which are closely associated with the term happiness, were suggested by 55% of the raters. In fact, 90% of the raters believed that happiness and/or fun were expressed by “artist” 2 through his artwork. A consideration of the “artist’s” statement as to what he was trying to express confirms that the raters are accurate as the images depicted are from “...happy days”. These emotions and behaviours may have been relatively easy to interpret due to the content and style of the artwork (Appendix 13). The “artist” has placed a smiling cartoon-like image of himself in the central frame which could quite easily suggest the mental state the “artist” wishes to portray. Furthermore, the cartoon-like image and style of the artwork also suggested to 22% of raters that the “artist” is child-like.

The other commonly used term suggested by 24% of raters to describe “artist” 2 was outgoing/ extraverted. In fact, “artist” 2 had the second highest extraversion score for the male “artists” (Table 26) and so these raters are accurate in their interpretation of this “artist” relative to the other male “artists” in this study (Table 31).

#### **7.3.1.3. Artwork 3**

“Artist” 3 appears to have produced a clear message through his artwork of him being calm and laid back (Appendix 14). In fact, 55% of raters used such adjectives to describe the image of the “artist” which came into their minds. This would suggest that, if true then the “artist” should have a low score for

neuroticism which is found to be the case relative to the other male “artists” since he has the 3<sup>rd</sup> lowest scores (Table 26 & 31). He was also believed to want to escape by 24% of the raters, which was captured by the terms day-dreamer, idealist, escapism, wistful, desire, longing, want a better life, and wants to escape. These adjectives and phrases may load most heavily on the Openness domain as they suggest someone who may be imaginative and prone to fantasy. However, the adjectives simple, simplicity and uncomplicated are also used by 24% of the raters not only for the picture but also for the “artist”, which would suggest someone low in openness. The latter is a more accurate interpretation if comparing this artist to the other five since “artist” 3 had the lowest openness score of all the male “artists” in this study (Table 26) and his score is also low when compared to the norms (Table 31).

Furthermore, 18% of raters considered the artwork to be expressing happiness and fun which some also believed to be part of the “artists” personality. This is probably to do with their associations with the subject matter of holidays rather than anything explicit in the picture.

Interestingly, only 14% took the picture at face value and believed that the “artist” wanted/needed a holiday which may be a more accurate evaluation of the picture when the “artist’s” description is taken into account. The fact that the majority of raters tried to find a deeper meaning in the picture may be a bias in the sample since most of them are psychology undergraduates who are participating in a psychology experiment and therefore may assume that they should look deeper into the underlying meaning of a picture.

#### 7.3.1.4. Artwork 4

Artwork 4 has generated a large and varied number of responses (Appendix 14). In fact, the adjective most commonly used is confusion (or puzzlement). This was suggested by 43% of the raters many of whom attributed this word not only to the emotions evoked by the artwork but also to how the “artist” was feeling. However, a consideration of the description given by the “artist” suggests that the “artist” is not experiencing such feelings or at least is not conveying this through this piece of art. Thus, the use of the word confusion may actually be more a reflection of the raters difficulty in interpreting this piece. The “artist” does however, in his description, suggest that he is portraying positive emotions and this is reflected in the much higher percentage of raters (29%) who described positive emotions (fun/ happy/ excitement/ pleasure/ joy/ celebration/ content/ high-spirited) compared to those (14%) who felt that the artwork conveyed more negative emotions (pain/ worry/ stressful/ sad/ anger/ moody/ lonely/ scared).

Moreover, 28% believed the “artist” to be a complex, thoughtful person and 22% considered him to be creative. This would suggest that the “artist” was high in Openness. Whilst “artist” 4 had the 4<sup>th</sup> highest score in openness compared with the other male “artists” his actual score was 89/100 (Table 26), which shows a medium high level of openness, and so suggests some accuracy (Table 31).

“Artist” 4 did an intricate, detailed piece of work with a number of meanings which would be very difficult for anyone who did not know him to interpret. Nevertheless, raters appear to be able to gain some relatively accurate insight into the “artist” through viewing his artwork.

#### 7.3.1.5. Artwork 5

For artwork number 5 there does not appear to be as clear a sense of what the “artist” is trying to convey. Nevertheless, the most frequent response from 31% of raters was that the “artist” liked nature/ wildlife/ birds/ countryside/ the environment/ animals which is in fact what the “artist” himself states that he was trying to convey (Appendix 14). Sixteen percent of raters suggested that the “artist” was either conveying a sense of freedom or that he wanted to escape/ gain his freedom. This was possibly due to the representation of the bird which could just fly away from a situation thus suggesting freedom.

There appears to be two main personality traits which the raters believe are being expressed in the artwork. The first is fun/ happiness/ joy/ playfulness/ content which were stated by 28% of raters. This would load most strongly on the extraversion factor (McCrae & Costa, 1987). Moreover, other adjectives which have been associated with extraversion such as bold, extraverted and friendly have also been mentioned by 10% of the raters. Since “artist” number 5 scored 99/100 on extraversion (Table 26), which is an extremely high score, then there appears to be accuracy in these raters’ interpretation of the “artist” through the artwork (Table 31).

The other personality trait, suggested by 24% of raters, is low neuroticism which is captured by the adjectives peace/ calm/ relaxation/ serenity/ tranquillity/ at ease with self (McCrae & Costa, 1987). Again this appears to be an accurate interpretation of the “artist” when it is considered that he scored 37/100 on

neuroticism (Table 26 & 31) which is a low score. Therefore, although the emotions and what the artwork is communicating do not appear to be as evident to the raters as they are for the other artworks the words and phrases which are most prominently used do show an accurate interpretation of the “artist”.

#### **7.3.1.6. Artwork 6**

Artwork 6 appears to have evoked a negative response from the raters and this is reflected in their choice of emotions which they attribute both to the artwork and the “artist” (Appendix 14). Although there is not a majority consensus for any particular group of emotions there was some consistency in responses. Feelings of unhappiness and anxiety (unhappy/ afraid/ worried/ scared/ stressed/ sadness/ depressed/ insecure/ anxious/ fear/ hurt) and impressions of boredom (boring/ boredom/ boring/ dull) were both mentioned by 24% of the raters. These groups of adjectives would suggest high neuroticism (McCrae & Costa, 1987). From the actual results of the personality test (Table 26) the raters are accurate since the “artist” had the highest male score of 95/100 for neuroticism (Table 31).

The terms lonely/ isolated/ feel excluded/ solitude were identified by 16% of the raters as being reflected in the artwork and 18% believed this to be true of the “artist” by using adjectives and phrases such as cold/ reserved/ private/ emotion sealed up/ introverted/ closed. If these two groups of terms are combined then 28% of the raters used one or more of these words which suggests that they considered the “artist” low in extraversion (McCrae & Costa, 1987). In fact, “artist” 6 had the 3<sup>rd</sup> highest extraversion score of 77/100 so although not

extremely extravert as is the case for “artists” 5 and 2, “artist” 6 is according to the norms high on this trait (Table 31).

Furthermore, 20% of the raters believed that the “artist” was trapped/ enclosed/ locked away/ boxed in/ had a need to burst free from barriers. It appears that these raters may be fairly accurate in their interpretation of his work since the “artist” appears to be saying that he has a front which he presents to people which does not always portray him in a positive light but that he would like others to see his other side. Interestingly, it appears that the majority of raters are only seeing the outside of the Box, and therefore the “artist”, and missing the softer inside as happens in his life.

#### **7.3.1.7. Summary**

Thus it can be seen that for each of the artworks there is some consensus as to the emotions and/or aspects of the “artists” which they are communicating and that there is also some accuracy to many of the interpretations (Table 31). However, some artworks appear to be more accurately interpreted than others. This does not appear to be due to their style, whether abstract or representational. However, probably the most easily and accurately interpreted artwork was number 2 which had an image of the “artist”. Thus, a bodily image of the “artist” may provide more clues to the personality, emotions and intentions of the “artist”.

Interestingly, the raters do not appear to have rated the “artist” which they chose to go out on a date with any more positively than those who did not chose him



(Appendices 14). Thus, it does not appear to be a simple relationship between how creative or fun or laid back or interesting, etc the “artists” are believed to be and whether the person will chose to go out on a date with that person. Different people appear to be looking for different things when thinking about whether to go out on a date with another person. This will be explored in more detail later in this chapter.

### **7.3.2. REFLECTIONS OF THE “ARTISTS” THROUGH THEIR ARTWORK**

#### **7.3.2.1. Rated Traits of the “Artists” and Ratings of the Artwork**

The raters were then asked to rate the “artists” on nine criteria (Appendix 10). These ratings were based on considerations of the “artists” artworks. It can be seen that the three criteria on which the artworks were rated all significantly, positively correlated with the ratings for the artists (Table 32).

**Table 32. Spearman's Rho Correlations Between Ratings for Artwork and Ratings for Artist**

	<b>Artwork Attractive</b>	<b>Artwork Interesting</b>	<b>Artwork creative</b>
How creative is the artist	$\rho = .511$ Sig .000	$\rho = .699$ Sig .000	$\rho = .721$ Sig .000
How intelligent is the artist	$\rho = .214$ Sig .000	$\rho = .323$ Sig .000	$\rho = .307$ Sig .000
How interesting is the artist	$\rho = .386$ Sig .000	$\rho = .557$ Sig .000	$\rho = .494$ Sig .000
How physically attractive is the artist	$\rho = .252$ Sig .000	$\rho = .273$ Sig .000	$\rho = .267$ Sig .000
How emotionally sensitive is the artist	$\rho = .254$ Sig .000	$\rho = .223$ Sig .000	$\rho = .237$ Sig .000
How physically skilled is the artist	$\rho = .392$ Sig .000	$\rho = .484$ Sig .000	$\rho = .513$ Sig .000
How outgoing is the artist	$\rho = .231$ Sig .000	$\rho = .237$ Sig .000	$\rho = .256$ Sig .000
How conscientious is the artist	$\rho = .265$ Sig .000	$\rho = .250$ Sig .000	$\rho = .289$ Sig .000
How friendly is the artist	$\rho = .303$ Sig .000	$\rho = .234$ Sig .000	$\rho = .237$ Sig .000

Note: N = 300 for the artwork attractive correlations and N = 288 for the artwork interesting and artwork creative correlations

Since the above consists of multiple ratings it is necessary to perform a Bonferroni adjustment to the significance level which is adjusted to 0.004. However, the above correlations remain significant.

Nevertheless, the majority of the correlations are weak although significant (Dancey & Reidy, 2002). However, “how creative” and “physically skilled the “artist” is” are moderately to strongly correlated with the three ratings for the artwork. This is unsurprising as these traits are closely related to the ability to

produce a creative product. These traits are also two that are identified by Miller (2001) as being qualities of the artist that art is demonstrating and so these results support Miller's claim since how creative the artwork is considered to be is significantly, positively correlated with how creative and physically skilled the artist is perceived to be by the raters. How interesting the artist is thought to be is also significantly moderately correlated with the three ratings for the artworks. This is not an aspect of the artist which Miller predicts will be expressed through the art although it is correlated with intelligence (Table 33) which Miller (2000b) states is closely correlated with creativity and so should be demonstrated through the art. Interestingly, how intelligent the artist is is only weakly, positively correlated with how creative the artwork is considered to be although this result is statistically significant. Thus, the raters in this study do not appear to be as strongly interpreting the creativity of the artwork as relating to the artist's level of intelligence as Miller would predict (Miller, 2000b). Correlations between the ratings for "artist's" traits are seen in Table 33.

**Table 33. Spearman's Rho Correlations Between Ratings For Artists on Different Traits** Note: Significance is two-tailed

	Creative	Intelligent	Interesting	Physically Attractive	Emotionally Sensitive	Physically Skilled	Outgoing	Conscientious	Friendly
Creative									
Intelligent	$\rho = .435$ Sig .000								
Interesting	$\rho = .650$ Sig .000	$\rho = .477$ Sig .000							
Physically Attractive	$\rho = .283$ Sig .000	$\rho = .205$ Sig .000	$\rho = .410$ Sig .000						
Emotionally Sensitive	$\rho = .418$ Sig .000	$\rho = .251$ Sig .000	$\rho = .339$ Sig .000	$\rho = .056$ Sig .328					
Physically Skilled	$\rho = .531$ Sig .000	$\rho = .488$ Sig .000	$\rho = .447$ Sig .000	$\rho = .314$ Sig .000	$\rho = .230$ Sig .000				
Outgoing	$\rho = .275$ Sig .000	$\rho = -.050$ Sig .383	$\rho = .324$ Sig .000	$\rho = .404$ Sig .000	$\rho = -.122$ Sig .032	$\rho = .193$ Sig .001			
Conscientious	$\rho = .390$ Sig .000	$\rho = .378$ Sig .000	$\rho = .317$ Sig .000	$\rho = .108$ Sig .059	$\rho = .408$ Sig .000	$\rho = .405$ Sig .000	$\rho = -.026$ Sig .648		
Friendly	$\rho = .307$ Sig .000	$\rho = -.047$ Sig .416	$\rho = .334$ Sig .000	$\rho = .408$ Sig .000	$\rho = .084$ Sig .141	$\rho = .198$ Sig .000	$\rho = .743$ Sig .000	$\rho = .145$ Sig .011	

To determine which aspects of the artworks are predicting the characteristics of the “artists” multiple regression analysis was conducted for each of the “artist’s” rated traits. Due to multiple ratings the Bonferroni adjustment was made and the significance level became 0.004.

The results demonstrating which of the ratings of the artwork significantly predicted which qualities of the “artists” are in Appendix 15. Since this section is attempting to understand what aspects of the artwork significantly predict the qualities of the “artists” only these findings will be discussed.

Thus, after correcting for multiple ratings, perceived interestingness of the artwork only significantly predicts the “artist’s” rated interestingness ( $\beta = 0.223$ ,  $p = 0.003$ ) and rated creativity ( $\beta = .207$ ,  $p = 0.001$ ) and perceived creativity of the artwork only significantly predicted rated creativity of the “artist” ( $\beta = .355$ ,  $p < 0.001$ ) (Appendix 15). The attractiveness of the artwork was not a significant predictor of any of the “artists” rated qualities. Therefore, very few of the rated qualities of the “artists” were predicted by the three rated variables of the artwork. In fact, attractiveness did not indicate any of the rated variables for the “artists”, which argues against Miller’s premise that it is the aesthetic judgement of the art that indicates the qualities of the artists (Miller, 2001).

Since Miller (2000b) places considerable emphasis on creative products being indicators of intelligence it is interesting to note that creativity of the artwork is not a significant predictor of intelligence of the “artist”. In fact, it appears that creativity and intelligence are not closely associated in the minds of this sample

of raters. Moreover, interestingness, which is moderately positively correlated with intelligence of the “artists” (Table 33), is also not significantly predicted by the creativity of the artwork. Thus, Miller’s (2000b) premise that creative behaviours primarily evolved to act as an indicator of intelligence is not supported. However, only three attributes of the artworks were rated and it may be that other qualities of the artworks not considered within the questionnaire are indicating the “artists” qualities to the raters, for example, the use of colour may indicate outgoingness.

One final point of interest is the relationship between physical attractiveness of the “artist” and attractiveness of the artwork. Although physical attractiveness is found to be more greatly desired in mate preference studies by males compared to females (Buss, 1989) it does appear that this may be a characteristic that is becoming more relevant in female mate choice (Buss et al., 2001). Interestingly, there is a positive, significant correlation between the ratings for attractiveness of the artwork and how physically attractive the “artist” is perceived to be by the female raters (Table 32). Other than artwork 2 that contained a cartoon image of the “artist” (Appendix 13) none of the other artworks provided any obvious indications of appearance. Feedback from some of the raters in the pilot study indicated that they either formed a very clear image of what the “artist” looked like or that they had no mental image at all of the appearance of the “artist”. If the attractiveness of the artwork was associated with how attractive the artist was believed to be then this would support the sexual selection model since it is a factor that is likely to influence mate choice, although Miller does not state that this is one of the qualities of the artist which is demonstrated by their art.

However, when a multiple regression analysis was conducted the attractiveness of the artwork was not a significant predictor of the perceived physical attractiveness of the “artist” (Appendix 15).

Nevertheless, the two variables which significantly predicted ratings of attractiveness of the “artists” were how interesting and friendly the “artists” were rated as being (Appendix 15), with the latter being the slightly stronger predictor. This suggests that these two characteristics of the “artists” suggest most strongly the physical attractiveness of a person. This may be more easily understood with friendliness which suggests someone who may be smiling which is linked with the attractive emotion of happiness and may induce positive feelings in the other person thus causing them to perceive the friendly person as physically attractive. Moreover, this and interestingness may be due to the findings that people tend to attribute more positive characteristics to more attractive individuals (Albright et al., 1988). Thus, it is possible that artworks which convey more positive emotions and traits may cause the artist to attract more sexual partners due in part to the association with physical attractiveness.

#### **7.3.2.2. Actual Traits of the “Artists” and Ratings of the Artwork**

Nevertheless, the above considers whether the inferred qualities of the “artists” rather than the actual traits are reflected through the artwork. Table 34 therefore considers the correlations between the ratings for the artworks and the actual qualities of the artwork.

**Table 34. Correlations between Rated Artwork Variables and Actual Scores of Male “Artists”**

	Mean aggregated ratings for scores of how attractive the artwork is	Mean aggregated ratings for scores of how interesting the artwork is	Mean aggregated ratings for scores of how creative the artwork is
Creativity continuum mean score	$\rho = .657$ $p = .156$	$\rho = .429$ $p = .397$	$\rho = .429$ $p = .397$
Full Scale IQ	$\rho = .714$ $p = .111$	$\rho = .771$ $p = .072$	$\rho = .771$ $p = .072$
Neuroticism Score	$\rho = -.257$ $p = .623$	$\rho = -.086$ $p = .872$	$\rho = -.086$ $p = .872$
Extraversion Score	$\rho = -.029$ $p = .957$	$\rho = -.429$ $p = .397$	$\rho = -.429$ $p = .397$
Openness Score	$\rho = -.348$ $p = .499$	$\rho = .145$ $p = .784$	$\rho = .145$ $p = .784$
Agreeableness Score	$\rho = .143$ $p = .787$	$\rho = .600$ $p = .208$	$\rho = .600$ $p = .208$
Conscientiousness Score	$\rho = .058$ $p = .913$	$\rho = .145$ $p = .784$	$\rho = .145$ $p = .784$

From the above table it can be observed that there were no significant correlations between the raters scores for the attributes of the artwork and the actual scores of the “artists” on personality traits, creativity and intelligence. Therefore, it appears that these characteristics of the artwork do not accurately reflect the qualities of the “artists”.

Furthermore, the fact that the correlation between the creativity continuum scores and ratings for creativity of the artwork are non-significant do not support the validity of the creativity continuum. Nevertheless, the correlation is moderate in size and so lack of significance may be due to low statistical power.



Interestingly, the one variable which nears significance is FSIQ. If significant this would support Miller's (2000b) hypothesis that the artwork is acting as an indicator of the intelligence of the "artist".

Therefore, it appears that although the attributes of the artworks rated in this study do at least appear to reflect some of the raters' inferred traits of the "artists" they do not act as reliable indicators of the actual characteristics of the "artists". However, it is possible that there are other aspects of the artworks which have not been considered here that do reflect the "artists'" traits.

The next step to testing whether artworks act as fitness indicators is to identify whether there is consensus between raters in their ratings.

#### **7.4. CONSENSUS BETWEEN RATERS**

"Consensus refers to the extent to which judges agree in their ratings of a common target" (Kenny et al., 1994). It is therefore important to consider whether raters demonstrate consensus for their interpretation of the variables since above chance agreement would suggest that raters are rating the artwork on similar criteria and therefore that the artworks are transmitting consistent and interpretable messages regarding the relevant variables.

##### **7.4.1. CONSENSUS FOR VARIABLES OVER ALL ARTWORKS**

To compute the degree of consensus of ratings for each variable the artwork was rated on, intraclass correlations (ICC) were computed ICC (2,1). This method

was also used by Vazire & Gosling (2004) and Borkenau & Liebler (1993).

Table 35 shows the ICCs for the 11 variables.

**Table 35. Artwork Ratings Degree of Consensus.**

Rated Variable	Intraclass Correlation	95% CI Lower Bound	95% CI Upper Bound	df	Significance
Attractiveness of Artwork	.420	.209	.817	5, 245	.000
Interestingness of Artwork	.512	.279	.866	5, 235	.000
Creativity of Artwork	.648	.408	.918	5, 235	.000
Creativity of Artist	.488	.261	.854	5, 250	.000
Intelligence of Artist	.267	.113	.697	5, 250	.000
Interestingness of Artist	.235	.095	.662	5, 250	.000
Physical Attractiveness of Artist	.022	-.004	.189	5, 250	.062
Emotional Sensitivity of Artist	.085	.023	.399	5, 250	.000
Physical Skill of Artist	.379	.181	.791	5, 250	.000
Outgoingness of Artist	.399	.195	.805	5, 250	.000
Conscientiousness of Artist	.192	.073	.606	5, 250	.000
Friendliness of Artist	.407	.200	.809	5, 250	.000

Note. CI= Confidence Interval.

From Table 35, it can be observed that apart from “physical attractiveness of the artist” the ICCs were positive and significant for all variables, mean ICC (2,1) = .34. Furthermore, the mean ICC (2,1) for the personality variables was .31 and for the artwork ratings .53. Therefore, for all variables, other than “physical attractiveness of the artist”, there is a greater than chance agreement that there is consensus between raters on ratings for each of the variables. This suggests that, regardless of accuracy, observers of art may interpret certain features of the artwork as well as personality traits, physical skill, and some cognitive abilities

of the “artist” from the artwork with some degree of agreement. However, since the nearer to 1 the ICC is the greater the degree of consensus, it can be observed that the degree of consensus varies according to the variable being rated. Therefore, in general there is a greater degree of consensus when rating the artwork than when rating the artist via the artwork. This is unsurprising since the ratings for the artist rely on forming an opinion and image of the artist through the artwork which may differ considerably between individual raters whereas the image of the artwork will not vary greatly between raters unless they have some form of visual impairment.

The creativity of the artwork demonstrates the strongest consensus with the creativity of the artist closely following. Thus it appears that there may be some general agreement with what is creative. This would be expected as the majority of participants come from a similar white western culture and are close in age and so would have experienced similar messages from their culture as to what is and is not creative. In fact, a high degree of consensus for ratings of creativity is important to the sexual selection hypothesis since there needs to be some agreement as to what is creative within a society for it to be considered to be desirable to mate with those individuals displaying creative behaviour as this enables it to be generally agreed as to who possesses “good genes”.

Moreover, since the majority of raters were found to not be interested or only quite enjoy looking or reading about the visual arts (Table 29) then the ratings of creativity come from a layman’s perspective rather than from people well versed in the Arts. This makes this study more applicable to the sexual selection

hypothesis since it assumes that art is acting as a fitness indicator for all individuals and that it is not necessary to have an in depth understanding to be able to assess the qualities of the “artist” expressed through the artwork.

The relatively lower, although still significant, level of consensus for ratings of intelligence suggests that the artwork is not clearly signalling equally across observers of the art as to the intelligence of the “artists” which argues against Miller’s (2001) statement that art is primarily acting as an indicator of the intelligence of the artist. This is supported by the similar ICC for the ratings for how interesting the artist is which, as previously discussed, is correlated with intelligence.

The fact that there is greater consensus for the interestingness of the artwork as opposed to the interestingness of the “artist” may suggest that the raters have different meanings of the term when applied to the “artists” and their artwork. Thus, interesting artwork may imply a particular level of complexity or that the content captures the imagination whereas an interesting person may suggest aspects of their ability to verbally communicate or the activities they engage in. Nevertheless, the fact that interestingness of the artwork significantly predicted interestingness of the “artist” (Appendix 15) suggests that the two uses of the term are associated.

Other studies of consensus for personality assessment when viewing the actual person or their extended phenotype have found that there is greater consensus on ratings of some personality traits than others (Albright et al., 1988, Borkenau &

Liebler, 1993, Funder & Colvin, 1988, Funder & Dobroth, 1987, Gosling et al., 2002, Vazire & Gosling, 2004, Watson, 1989) and that this is due to the visibility of the behaviours that indicate the trait so that those traits with more easily visible behaviours such as extraversion are easier to judge whereas those where behaviours tend to be initially more hidden, such as neuroticism show less consensus and accuracy in ratings (Blackman & Funder, 1998, Funder & Dobroth, 1987). Whilst all ICCs for personality ratings of the artist were found to be significant the ICCs for emotional sensitivity (neuroticism) and conscientiousness were both very low. For outgoingness (extraversion) and friendliness (agreeableness) there was higher consensus and openness, as measured by creativity of artist, was found to demonstrate the highest consensus as would be expected since creative products should most clearly indicate the level of openness due to their close association. Thus, the raters appear to be in moderate agreement as to how open, extravert and agreeable the “artists” are and so artwork may be better at displaying these traits, regardless of accuracy, than conscientiousness and neuroticism.

When observers rated people’s personalities from viewing their bedrooms and offices in Gosling et al’s (2002) study similar results were found to this study in that openness showed the strongest consensus and emotional stability the least with extraversion and agreeableness coming somewhere in between (Table 36). However, conscientiousness was found to have the strongest consensus after openness (Gosling et al., 2002) whereas in this study it demonstrated only weak consensus. In another study looking at personal websites raters showed greatest consensus for openness and extraversion ratings, followed by agreeableness and

conscientiousness with emotional stability being significantly weaker (Vazire & Gosling, 2004) (Table 36). Therefore, it appears that the artworks in this study are also displaying similar messages about the Big Five personality traits as did the personal websites in Vazire & Gosling’s (2004) study. Furthermore, in this and the two studies discussed above openness appears to be most clearly interpretable from extended phenotypes of individuals and emotional stability the least with extraversion and agreeableness demonstrating moderate levels of consensus. Thus, if individuals are in part making decisions about the desirability of a person as a potential mate through their extended phenotypes this suggests that such judgements may actually be a quite high risk strategy since a person could end up with a partner high on neuroticism, which can affect survival and reproductive success, although this could be less of a problem for short-term matings.

**Table 36. Comparison of Interobserver Consensus on Personality Traits for Different Extended Phenotypes**

	Offices (Gosling et al, 2002)	Bedrooms (Gosling et al, 2002)	Websites (Vazire & Gosling, 2004)	Artwork
Extraversion	.39**	.31*	.32**	.40**
Agreeableness	.23*	.20	.28**	.41**
Conscientiousness	.42**	.47**	.27**	.19**
Neuroticism	.14	.08	.18*	.09
Openness	.51**	.58**	.32**	.49**

Note: \*p<.05 and \*\*p<.01. Consensus for offices and bedrooms is the mean of the 28 and 21 correlations respectively derived from all possible pairwise combinations of 8 and 7 observers respectively. Consensus for websites and artwork is the ICC(2,1) for all 11 and 51 raters respectively. Openness for the artworks is extrapolated from the ICC for how creative the “artist” is.

The difference in consensus among the personality traits may be due to visibility as discussed above. Whilst openness tends not to be easily visible when meeting a person, particularly when there is no verbal contact, it is likely to be much more evident in the above extended phenotypes. For example, evidence of

quantity and variety of CDs, magazines, and books as well as how decorated and colourful the rooms were perceived to be were found to be significant clues to the assessment of openness in Gosling et al's (2002) study. It is likely that similar cues would be used to assess openness on personal websites. For artwork openness should be more easily assessed due to its relationship with creativity as well as possibly the colourfulness of the artwork and the use of space and materials.

Interestingly, extraversion also showed relatively high consensus for all of the extended phenotypes (Table 36). This suggests that extraversion continues to remain a more visible trait even in extended phenotypes. A consideration of the cues found to be significantly used in the assessment of extraversion for bedrooms and offices are all also found to be significantly used to assess openness, for example, whether the room was decorated and cluttered, and for offices only how colourful it was and how stylish. However, whether it was decorated and how inviting the room was were the only two variables that were found to validly assess extraversion from offices out of those which were significantly found to be used to assess this variable (Gosling et al., 2002). Moreover, none of the cues significantly used to assess extraversion from bedrooms were found to be valid cues. Therefore, it is difficult to identify what characteristics of offices and bedrooms enabled significant consensus to be achieved by the raters.

Albright et al (1988) found that in zero acquaintance studies, where there was no opportunity for interaction, extraversion was assessed through physical

attractiveness of the participants so that the more physically attractive they were perceived to be the higher they were scored on extraversion ( $r = 0.74$ ,  $p < .05$ ). Furthermore, it was found that raters were accurate in their assessments of sociability (extraversion) in two out of the three studies conducted. Moreover, attractiveness of participant was also found to correlate with good-natured (agreeable) although unfortunately the actual correlations and significance levels were not reported (Albright et al., 1988). As Albright et al (1988) state in studies such as these any significant consensus in ratings of personality traits must be attributed primarily to the physical features of the target. For this study, it was found that how outgoing and how friendly the “artists” were believed to be were both significantly correlated with the perceived attractiveness of the artwork (Table 32). Furthermore, both personality variables were moderately significantly correlated with how physically attractive the “artist” was considered to be (Table 33). A consideration of the multiple regression analyses for outgoingness and friendliness of the “artists” show that perceived physical attractiveness of the “artist” was a significant predictor for friendliness ( $\beta = 0.143$ ,  $p = 0.001$ ) but not outgoingness ( $\beta = 0.050$ ,  $p = 0.235$ ) but physical attractiveness of the artwork was not a significant predictor of either trait (Appendix 15). Thus, as in Albright et al’s (1988) study friendliness (agreeableness) and possibly outgoingness (extraversion) were both assessed, at least in part, by the perceived attractiveness of the artwork and/or “artist” thereby supporting Albright et al’s (1988) claims that people tend to attribute more positive traits to more attractive targets. Whether there is actually a real relationship between these variables or whether these relationships are due to shared stereotypes requires further investigation.



However, the ICCs for the ratings for the physical attractiveness of the artist were non-significant and the confidence intervals pass over 0 which is the null hypothesis of no consensus (Table 35). This confirms the feedback given by the participants in the pilot study which suggested that people were divided as to whether they could form a physical image of the artist in their minds. Thus, the artwork alone is a poor signal of how physically attractive the artist is. It is interesting that the raters used the attractiveness of the artwork to interpret some of the personality traits but did not extend this to physical attractiveness. This may be because aspects of the artwork that are used to indicate certain personality traits, for example the possible use of colour to indicate extraversion, may be those that are also found to influence decisions on attractiveness of the artwork whereas there may be no clear indicators of physical attractiveness of the artist within the artwork which is why the consensus on physical attractiveness is non-significant.

Finally, an interesting point is that although there is significant consensus among the raters for all variables, apart from physical attractiveness, it is not clear what aspects of the artwork are providing the majority of this information since multiple regression analysis found that it was only the ratings for the “artists” on interestingness and creativity which were predicted by the variables on which the artwork was measured (Appendix 15). Thus further research needs to be conducted into this area and to consider factors including content, use of colour, complexity, and style of the artwork. It is important to consider that it is possible that consensus is in part due to discussion among raters. However, raters were

not all in the room at the same time and in fact the rating took place over two days. Therefore, this is less likely to be the case.

#### **7.4.2. CONSENSUS FOR INDIVIDUAL ARTWORKS**

Whilst the above demonstrates the degree of consensus between raters over the ratings for all of the artworks for each variable it is also relevant to consider the degree of consensus between raters for each separate piece of artwork for all of the 12 variables. This will demonstrate whether some pieces of art appear to be more clearly demonstrating certain qualities than others. If this is the case then this may cause problems for the sexual selection model of art since this assumes that all artworks can equally be assessed otherwise those who use artworks that are not clearly indicating the qualities of the artists are likely to make inaccurate and therefore possibly poor mate choice decisions. To do this the means and standard deviations (SD) were computed for each of the artworks on each of the variables and the size of the SDs relative to the means was compared for each piece of art on separate variables (Tables 37 to 48). The smaller the SD the less variance within the ratings, as the scores will be more closely clustered around the mean, and so the greater the consensus between the raters on the scoring of the artwork on a particular variable. Histograms of the frequencies of the scores on each variable were also used to confirm the findings (Appendix 16).

##### **7.4.2.1. Attractiveness of Artwork**

Means and standard deviations (SD) for ratings of attractiveness can be seen in Table 37. It appears that artwork number 6 produced the greatest consensus between raters and number 3 the least agreement although numbers 1 and 5 also

showed lower levels of consensus. Furthermore, number 6 produced a much stronger reaction from the raters with a general feeling that it was relatively unattractive whereas the others produced a much wider range of scores (Appendix 16). Interestingly, number 3 appears to have elicited a more divided response than the other artworks so that this would account for the higher SD rather than it being due to just a much wider spread of evenly placed scores (Appendix 16). Therefore, although number 3 shows the least amount of consensus between raters for the scoring of attractiveness it appears that it is not because it is giving a very unclear message as to its attractiveness but rather that it polarises opinion as to this variable.

**Table 37. Means and Standard Deviations for Each Artwork Rated on Attractiveness of the Artwork**

Artwork Number	Mean	SD
1	6.41	2.24
2	5.21	2.06
3	5.63	2.44
4	6.73	1.86
5	6.86	2.28
6	1.79	1.11

**7.4.2.2. Interestingness of Artwork**

The means for “interestingness of artwork” (Table 38) are more varied than for attractiveness of artwork which either suggests that the artwork was more easily rated on interestingness and so participants were not scoring more safely by using the scores around the middle of the scale, or that the artworks actually varied much more greatly on interestingness than some of the other variables.

Artwork number 4 showed the greatest degree of consensus and artwork 2 the least amount, due it appears to a wide spread of scores (Appendix 16). Number 4

was also found on average to be the most interesting piece of art and number 6 the least.

**Table 38. Means and Standard Deviations for Each Artwork Rated on Interestingness of the Artwork**

Artwork Number	Mean	SD
1	7.29	1.95
2	5.65	2.29
3	4.00	2.13
4	8.18	1.58
5	6.38	1.81
6	2.83	1.94

**7.4.2.3. Creativity of Artwork**

Again the raters varied on how much they were in agreement when rating the artwork on creativity (Table 39 and Appendix 16). As with interestingness number 4 demonstrated the most consensus in ratings and 2 the least. Furthermore, 4 was rated the most creative and number 6 the least creative. Interestingly, it appears that in general the raters were clearer on how creative an artwork was if the artwork was more abstract (artwork numbers 1,4, and 6) and demonstrated less consensus when the artworks were more representational (artworks 2, 3, and 5). It may be that the more abstract artwork provoked stronger reactions within the raters and so were easier to score on creativity.

**Table 39. Means and Standard Deviations for Each Artwork Rated on Creativity of the Artwork**

Artwork Number	Mean	SD
1	7.75	1.77
2	5.78	2.13
3	4.24	1.94
4	8.47	1.46
5	6.97	1.66
6	2.19	1.57

#### **7.4.2.4. Summary for Consensus among Ratings for Artwork**

Therefore, it appears that whilst the intraclass correlations were relatively high individual artworks did vary as to the degree of consensus for ratings of the three variables. Furthermore, some artworks show higher levels of consensus across these variables than others. For example, artwork numbers 4 and 6 were consistently rated with higher degrees of consensus whereas ratings for artworks 2 and 3 showed much less agreement among raters. Therefore it is possible that certain styles of artwork or types of medium etc may influence the level of consensus among observers as to the attractiveness, interestingness and creativity of the artwork. With this in mind it is interesting to note that the two artworks demonstrating the highest levels of consensus were more abstract pieces and the two showing the least consensus were not only both more representational but also had a more simplistic or childlike quality to them (Appendix 13).

### **7.4.3. CONSENSUS FOR INDIVIDUAL ARTWORKS ON RATINGS OF “ARTIST”**

#### **7.4.3.1. Creativity of “Artist”**

Whilst artwork number 4 demonstrated the most consensus for ratings of how creative the “artists” were, number 6 showed the least consensus (Table 40 and Appendix 16). Apart from artwork 6 the other artworks showed similar levels of consensus for creativity of artist as they had done for creativity of artwork. Artwork 6 evoked a strong apparently negative reaction from the raters when considering the creativity of the artwork which led to high consensus. However, there appears to be, by some of the raters, perhaps a belief that their views as to

its creativity may be down to personal opinion and therefore not reflect the actual creative ability of the artist thereby reducing the degree of consensus when rating the artist on this variable. Furthermore, when the means are considered it can be seen that if rated for size the ratings for creativity of the artwork have similar, although not exact, ratings as those of the ratings for the artists on the same variable. Therefore, this lends some support for the sexual selection hypothesis that creativity of the artwork reflects the creativity of the artist.

Furthermore, “artist” 4 was rated the most creative, which is supported by the responses to what the artwork is communicating about the “artist” (Appendix 14). In fact, “artist” number 1 was also stated to be creative when looking at what the artwork is communicating about the “artist” (Appendix 14) and this is again reinforced by the mean rating for creativity of the “artist” which was 7.14 (Table 40).

**Table 40. Means and Standard Deviations for Each Artwork Rated on Creativity of the “Artist”**

<b>Artwork Number</b>	<b>Mean</b>	<b>SD</b>
1	7.14	1.59
2	6.00	2.04
3	5.10	1.92
4	8.53	1.22
5	7.24	1.63
6	3.73	2.33

#### **7.4.3.2. Intelligence of the “Artist”**

Artwork 4 showed the greatest degree of consensus for ratings on intelligence of “artist” and artwork 6 the least (Table 41 & Appendix 16). Whilst in general “artist” number 6 was considered to be the least creative he was not considered to be the least intelligent and so the raters in this study do not appear to be equating

low creativity with low intelligence as Miller (2000b, 2001) suggests. However, since number 4 was rated both the most intelligent and most creative there may be a connection made between high creativity and high intelligence. “Artist” number 2 was rated as the least intelligent with quite high consensus, although was not thought to be the least creative. This may be due to the more childlike quality of the artwork.

**Table 41. Means and Standard Deviations for Each Artwork Rated on Intelligence of the “Artist”**

Artwork Number	Mean	SD
1	7.35	1.43
2	5.27	1.42
3	6.65	1.61
4	7.84	1.22
5	6.78	1.51
6	6.41	2.00

**7.4.3.3. Interestingness of “Artist”**

Again the artwork that showed the most consensus for ratings of how interesting the “artist” is believed to be was number 4 and that which demonstrated the least consensus was number 6 (Table 42 and Appendix 16). Interestingly, apart from number 4, the ratings for how interesting the “artist” is do not show the same levels of consensus as the ratings for how interesting the pieces of art are with artworks 5 and 6 showing a drop in consensus and numbers 1, 2 and 3 showing a rise in consensus from rating the artwork to rating the artist. Nevertheless, the ratings of the six means are equivalent so that number 4 has the highest mean, followed by numbers 1, 5, 2, 3 and finally 6 which has the smallest mean for both interestingness of artwork and interestingness of artist. Therefore, it appears that the raters consider that how interesting the artwork is, is a reflection

of how interesting the “artist” is, as was found in the multiple regressions (Appendix 15).

**Table 42. Means and Standard Deviations for Each Artwork Rated on Interestingness of the “Artist”**

<b>Artwork Number</b>	<b>Mean</b>	<b>SD</b>
1	7.12	1.49
2	6.45	1.68
3	5.65	1.73
4	7.73	1.20
5	6.65	1.76
6	5.18	2.18

#### **7.4.3.4. Physical Attractiveness of “Artist”**

For ratings of attractiveness of the “artists”, artwork number 2 demonstrates the most consensus and artwork 6 the least (Table 43 and Appendix 16). The histograms (Appendix 16) show that unlike the other variables the scores are more evenly spread over the whole range. This may be due to difficulties some raters had of scoring the “artists” on this variable as previously discussed and thus the overall consensus ratings being found statistically non-significant (Table 35). Moreover, the mean scores are within a very small range suggesting more difficulty in rating the “artists” on this variable. Furthermore, the rankings of the means for attractiveness of the artwork compared to those of the artist bear little comparison. This suggests that the attractiveness of the artwork may not be considered to reflect the physical attractiveness of the artist, as was confirmed in the multiple regression (Appendix 15).



**Table 43. Means and Standard Deviations for Each Artwork Rated on Physical Attractiveness of the “Artist”**

<b>Artwork Number</b>	<b>Mean</b>	<b>SD</b>
1	5.94	1.73
2	6.06	1.54
3	6.02	1.94
4	6.33	1.66
5	5.84	1.63
6	5.25	2.24

#### **7.4.3.5. Emotional Sensitivity of “Artist”**

For ratings of emotional sensitivity of the “artist” artwork 4 had the greatest consensus and artwork 6 the least (Table 44 and Appendix 16). Again from a consideration of the histograms (Appendix 16) and the means raters appear to be scoring more towards the centre of the scale which may suggest that they are finding it difficult to estimate emotional sensitivity from viewing the artwork. It is possible that art is not a good medium for expression of such a trait, as has been also found in studies on bedrooms, offices and websites (Gosling et al., 2002, Vazire & Gosling, 2004), or that the themes of the artwork in this study are not effective in allowing another individual to judge emotional sensitivity. Also, emotional sensitivity may be a trait that is more evident after sometime of knowing an individual and so a consideration of extended phenotypes would not be appropriate indicators of such a trait. This would support the studies conducted on assessment of personality through face-to-face contact and personal knowledge of participants which found that traits which are indicated by less visible behaviour, such as neuroticism, show less consensus by raters, as well as reduced accuracy (Funder & Colvin, 1988, Funder & Dobroth, 1987, Kenny et al., 1994).

**Table 44. Means and Standard Deviations for Each Artwork Rated on Emotional Sensitivity of the “Artist”**

<b>Artwork Number</b>	<b>Mean</b>	<b>SD</b>
1	6.73	1.99
2	5.24	2.03
3	5.90	1.89
4	6.78	1.63
5	6.86	1.80
6	5.65	2.78

**7.4.3.6. Physical Skill of the “Artist”**

When considering the physical skill of the “artist” raters showed greatest consensus for artwork 2 and least for number 6 (Table 45 and Appendix 16). In fact, all the SDs were below 2.00 which suggests that there was more agreement for all the artworks when scored on this variable than for most of the other variables. This is unsurprising since physical skill is something which can be directly assessed when viewing the artworks by considering such factors as the intricacy of the artwork and fine detail. However, if this is the case then it is surprising that 6 had the lowest mean score since it required considerable dexterity in its creation. However, this may not have come across in the finished product. If this is the case then artwork such as those made in this study may not always be a good display of physical skill or manual dexterity since to assess such abilities may require knowledge of the whole physical process of making the artwork.

**Table 45. Means and Standard Deviations for Each Artwork Rated on Physical Skill of the “Artist”**

<b>Artwork Number</b>	<b>Mean</b>	<b>SD</b>
1	7.02	1.61
2	5.12	1.48
3	5.61	1.88
4	7.53	1.75
5	6.84	1.64
6	4.35	1.90

#### 7.4.3.7. Outgoingness of “Artist”

Ratings for outgoingness showed the most agreement for artwork 2 and least for artwork 6 (Table 46 and Appendix 16). In fact, the consensus for artwork 2 was particularly high and this was further supported by the responses regarding what the artwork was communicating about the “artist” (Appendix 14). This may be because this was the only artwork which contained an image of a person (the “artist”) which was done in strong colours and was smiling (Appendix 13). Such an image may provide a much clearer, visible message for such a personality trait and so would produce more agreement in its ratings. However, this may also be due to the perceived attractiveness of the “artists” as discussed above although the rankings of the means for physical attractiveness and outgoingness do not exactly parallel one another.

Interestingly, consensus was greater for the more representational artwork than for the more abstract work. This suggests that different styles of artwork may express different aspects of the individual more clearly than other styles. Furthermore, the two highest scoring mean ratings were both more representational whereas the two lowest mean scores were more abstract artworks. Thus, it is possible that style of artwork also influences perceived level of outgoingness or extraversion of the artist.

**Table 46. Means and Standard Deviations for Each Artwork Rated on Outgoingness of the “Artist”**

Artwork Number	Mean	SD
1	5.20	1.71
2	8.25	1.18
3	5.43	1.57
4	6.75	1.79
5	6.90	1.66
6	4.33	2.28

#### 7.4.3.8. Conscientiousness of “Artist”

Conscientiousness of the “artist” may be another trait which is not clearly reflected in artwork, at least in this study, since the range of scores are more evenly spread and means are again more centred toward the middle of the rating scale (Table 47 & Appendix 16). Artwork 4 showed the most consensus and number 6 the least. Moreover, artworks 4 and 6 demonstrated the highest and lowest mean scores respectively

**Table 47. Means and Standard Deviations for Each Artwork Rated on Conscientiousness of the “Artist”**

Artwork Number	Mean	SD
1	6.69	1.84
2	5.27	1.55
3	6.63	1.88
4	7.31	1.52
5	6.73	1.77
6	5.08	2.43

#### 7.4.3.9. Friendliness of “Artist”

Artwork 2 shows the most consensus when rated for friendliness of the “artist” and artwork 6 demonstrates the least agreement among raters for this variable (Table 48 and Appendix 16). Nevertheless, all artworks demonstrate relatively high consensus since the largest SD is 1.71 (Table 48). This suggests that degree of friendliness of the “artist” is more apparent in the artwork than some of the other variables, which is also supported by the ICC for friendliness (Table 35). As for the ratings of outgoingness of the “artist”, artwork 2 also has the highest mean score and therefore appears to be considered the friendliest. This is probably to do with the cartoon-type, smiling image within this artwork. There is not however, the pattern of mean scores reflecting the style of the artwork as there is for the mean scores for outgoingness of the “artist”.

**Table 48. Means and Standard Deviations for Each Artwork Rated on Friendliness of the “Artist”**

<b>Artwork Number</b>	<b>Mean</b>	<b>SD</b>
1	5.90	1.45
2	8.27	1.25
3	6.31	1.67
4	6.43	1.54
5	7.10	1.57
6	4.53	1.71

**7.4.3.10. Summary of Consensus among Ratings for “Artists”**

Thus, when rating the artworks on a number of variables concerning the “artists” the artworks each have been found to vary on levels of consensus both within and between ratings on variables. It may be that different styles, compositions, uses of colour, and topics, as well as other factors, affect how effectively an artwork displays a particular trait to an observer.

Within this study it appears that some variables were more easily rated than others. Thus, participants appear to have found it more easy to rate the “artists” on creativity, physical skill, outgoingness and friendliness than on the other variables. This is based on the fact that many of the other variables have mean scores within the middle range for all of the artworks thus suggesting that the raters are “playing safe” when scoring. This assumption is supported by the ICC scores (Table 35) which are highest for the ratings of the “artists” on creativity, physical skill, outgoingness and friendliness.

Furthermore, some artworks were found to be better indicators of the traits than others. Artwork 4 and to a lesser degree 2 consistently showed the greatest consensus in ratings and therefore appear to be sending out the clearest messages

regarding the qualities of the “artists”. Moreover, artwork 6 demonstrated the lowest consensus for all of the variables for which the artists were rated on thus sending out the most conflicting messages. Thus it appears that some artworks are better displays (regardless of accuracy) of the “artists” qualities than others. This causes a problem for sexual selection theory since if this is true of all artwork, particularly that of professional artists, then artwork cannot be considered a reliable indicator of quality.

However, it is also important to consider whether the artwork is conveying accurate information about the “artists” since it may be that if an “artist” is considered to score particularly high or low on one variable then they may just be assumed to score in a similar vein on other variables and so consensus appears to be greater. Therefore, the next part of this chapter will consider how accurately the raters scored the artists on personality traits, creativity and intelligence.

## **7.5. ACCURACY OF RATERS SCORES**

Accuracy may be defined as “...a match between an observer’s ratings of a personality trait and the target’s actual standing on that trait” (Blackman & Funder, 1998). The relationship between consensus and accuracy is complex. Even if there is strong consensus between raters’ scores this does not mean that they are accurate reflections of the actual scores of the artist on a particular variable. However, if there is high accuracy among judges then there is likely to be high consensus. However, Blackman & Funder (1998) found that the amount of information available to raters was influential so that the effect of information on consensus is weaker than that on accuracy particularly at lower levels of

information. Thus, accuracy tends to be lower when there is less information and linearly increases with further information. However, consensus does not appear to significantly increase with more knowledge about the participant although the basis on which consensus is achieved may alter so that initial consensus with minimal information may be based on shared inaccurate stereotypes whereas when more data is available then consensus may be based on accurate judgement (Blackman & Funder, 1998). Therefore, as the artworks in this study are likely to provide only minimal information this may have the effect of producing high consensus but low accuracy for the rated variables.

To compute the level of accuracy scores for the observers' ratings were aggregated and correlated with the actual scores for the artists on each relevant variable as was also done in studies by Vazire & Gosling (2004) and Gosling et al (2002). Spearman's Rho was used due to the small number of scores (6) for each variable. Table 49 shows all the correlations.

**Table 49. Accuracy of Raters' Scores.**

<b>Variables Considered</b>	<b>Correlation Coefficient (Spearman's Rho)</b>	<b>Significance (2-tailed)</b>
"Creativity continuum mean" x "How creative is artist"	.371	.468
"Openness to Experience" x "How creative is the artist"	-.087	.870
Full Scale IQ x "How intelligent is the artist"	.943	.005
Neuroticism Score x "How emotionally sensitive is the artist"	.029	.957
Extraversion Score x "How outgoing is the artist"	.543	.266
Conscientiousness Score x "How conscientious is the artist"	.145	.784
Agreeableness Score x "How friendly is the artist"	.257	.623

Note: the first variable is the actual score of the artist and the second is the mean score of the raters' aggregated scores for that variable.

From the above table it can be seen that the only time that the raters achieve accuracy to a statistically significant degree is Full Scale IQ x "How intelligent is the "artist"" with the correlation being strongly significant. This result remained significant when the Boniferroni adjustment was made which meant that a significance value of 0.007 or less was necessary for a correlation to be significant. Thus, raters were able from the artworks to accurately predict the "artist's" level of intelligence but were unable to predict levels of creativity and personality traits accurately.

The results for personality traits do not reflect the findings in Vazire & Gosling (2004) and Gosling et al (2002) studies considering personality impressions from personal websites, and bedrooms and offices respectively. In fact, for the bedrooms and personal websites all observer accuracy ratings reached



significance for all five personality traits and for the observer ratings of the offices three of the five personality traits, extraversion, conscientiousness and openness to experience, were found to be statistically significant. Although the lack of accuracy may be due to the low statistical power of the results it is also interesting to consider other possibilities which may have contributed to the inaccuracy of the ratings.

As previously discussed above, it is probable that the non-significant results for accuracy are due to the small amount of information available in the artworks. In general one piece of art will not provide as many clues as to the characteristics of the individual as meeting an individual or seeing someone's bedroom or office. Furthermore, any clues provided by art may be more ambiguous. In fact in this study "artists" 3 and 5 actually intended to give very little away about themselves (Appendices 14) and those who tried to express more about their personalities, such as "artists" 1, 4, and 6, tended to do more abstract work (Appendices 14).

From the point of view of the ratings for creativity the lack of accuracy may also be because the "artists" were rating themselves using the creativity continuum which measures self-rated creative ability whereas the raters were rating the "artists'" actual products. Thus, "artists'" ratings of themselves may reflect their personal experiences, self-esteem, and the labels assigned to them by others as to how creative they are, what areas they may be creative in, and their own interpretations of what is creative, all of which may not reflect their ability in the creative task set in this study. Moreover, the "Definitions of Creativity" study showed that the majority of people do not consider science or technology to be

creative subjects. Therefore, those in such fields who hold this view may rate themselves as low in creativity but may actually produce an artwork which is considered to be creative.

Since the consensus between raters was highest for creativity of the artwork, closely followed by creativity of the artist (Table 35) then there appears to be some agreement as to what is creative. However, when considering the inaccuracy of the participants' ratings in light of sexual selection theory then this highlights a conundrum, if a person rates themselves as creative but is not considered creative by society then they may waste effort displaying their creativity likewise a person who does not think themselves creative but would be considered so by others would be missing out on an opportunity to display. Nevertheless, the correlation for the accuracy between the creativity continuum and creativity of the artist is moderate and the fact that it does not come to significance may be due to the low statistical power caused by the small number of artworks. Thus further research is required to extend the number of artworks without inducing rater fatigue to increase the statistical power.

The lack of accuracy in the scores for the five personality traits may in part be due to the wording of the questions since how outgoing, friendly and creative someone is may not tap into extraversion, agreeableness and openness respectively. However, McCrae & Costa (1987) consider sociability to be the core dimension of extraversion and so outgoing would be an appropriate word to capture this trait. Moreover, in the same study they found that the term friendly loaded highly on agreeableness (as well as extraversion) and so this should

capture at least some aspects of agreeableness (McCrae & Costa, 1987). However, whilst the mean aggregate ratings for scores by raters of “how friendly the “artist” is” are positively correlated with agreeableness scores (although non-significantly) they are more highly correlated with extraversion ( $\rho = 0.543$ ,  $p = 0.266$ ) although again non-significantly. Moreover, the mean aggregate scores for friendliness and outgoingness are perfectly positively correlated ( $\rho = 1.000$ ). Therefore, these two variables appear to be measuring a similar concept which is closer to extraversion than agreeableness although captures some aspects of the latter trait.

McCrae & Costa (1987) also found that creative was a term which loaded most strongly on the openness trait. Furthermore, artists who, from the “Definitions of Creativity Study” are considered archetypal creators, are also considered to be prime examples of individuals high in Openness (McCrae & Costa, 1997). Therefore, the term creative should be an appropriate indicator of how open an individual would be considered.

Finally, emotional sensitivity was also found by McCrae & Costa (1987) to load most strongly on the neuroticism factor. Furthermore, it has been previously used to measure what in the NEO-PI is termed neuroticism and so the use of this term should not be problematic when considering its equivalence to measuring neuroticism. Thus, whilst there may be some problems with some of the terms used to capture the five personality traits in this study, they should in general be close enough to measure the concepts they are claimed to measure.

The fact that extraversion came nearest to significance may be due to it being a more visible trait. From other studies it would be expected that it was the most visible traits which were rated most accurately, which for face-to-face assessments of personality is extraversion and sometimes conscientiousness (Albright et al., 1988, Blackman & Funder, 1998, Funder & Colvin, 1988, Funder & Dobroth, 1987). However, when raters are asked to assess personality through extended phenotypes of the participants the variation in accuracy scores has been found to differ. For offices accuracy was highest for openness followed by extraversion and then conscientiousness with emotional stability and agreeableness showing no accuracy and for bedrooms accuracy was again highest for openness but this time the next most accurate was conscientiousness, then emotional stability, extraversion and agreeableness (Gosling et al., 2002). Vazire & Gosling (2004) found an almost identical pattern when considering personal website. Openness showed the greatest accuracy followed by conscientiousness, then extraversion, emotional stability, and finally agreeableness (Vazire & Gosling, 2004). Thus, from these three studies openness appears to be the personality trait that is most easily assessed accurately and agreeableness the least with the other traits varying depending on the extended phenotype. It could be predicted that openness would be the most accurately rated personality variable for the artworks due to its strong relationship with creativity. However, this was found not to be the case. A consideration of the accuracy of raters' scores (Table 49) showed that the personality which most nearly approached significance was extraversion followed by agreeableness (possibly due to its close association with extraversion in this study), then conscientiousness, openness and neuroticism. Thus, it

appears that artworks emit more accurate signals about extraversion and agreeableness than they do openness to experience of the “artist”. An exploration into what cues the raters are using to assess the personality traits, as conducted in Gosling et al’s (2002) study, may provide insight into these results.

The difference in the actual and rated scores of the “artists” may also be due to the “artists” projecting different aspects of themselves through their art, whether consciously or unconsciously, which either may reflect how they would like to be (an ideal self) or how they wish to be perceived at that time depending on their thoughts and moods. If this is the case then from a sexual selection viewpoint this implies that art could be used deceptively to attract mates and may therefore not be an honest indicator.

That fitness indicators need to be honest indicators is important to the sexual selection theory as it prevents cheats and freeloaders gaining access to mates (Zahavi, 1975). However, whilst this is the case for many other species, from which sexual selection theory is based, and for humans when displaying physical attributes, it may not be the case for more cognitive displays of fitness for *Homo sapiens* since they possess Theory of Mind (ToM) which allows deception to occur. In fact, being good at deception could be a selective advantage, at least in terms of short-term matings, since it is possible to display personality characteristics through art which are more desirable than the artist possesses and then for him/her to keep up the pretence for the short-term to gain sexual access to a mate. Using a mathematical model, it has been demonstrate that signals need only to be honest on average and that complete honesty is not possible

(Johnstone & Grafen, 1993). Moreover, it appears that those searching for mates do not anticipate absolute honesty (Benz et al., 2005, Tooke & Camire, 1991). However, it has been found that an antagonistic interpersonal style which involves deceitful behaviour was related to having more sexual partners (Miller et al., 2004) which suggests that dishonesty can be an effective strategy for those attempting to attract mates. If more matings can be gained in this manner then the artist will be reproductively successful regardless of how “good” their genes are. This however is not necessarily a good situation for those mating with dishonest signallers. Nevertheless, there may be a time lag between the emergence of a signal and the ability to accurately assess the signal. This could then mean that the signallers can behave more dishonestly until the receivers are able to catch up (Johnstone & Grafen, 1993). This may be relevant to art production since its emergence in the archaeological record is relatively late. Thus, modern humans may not have evolved the mechanisms to accurately interpret artworks as fitness indicators or they may be using mechanisms adapted to interpret qualities from other displays thus allowing for the possibility of artists manipulating their audiences into imprecise interpretations of their personal attributes.

Nevertheless, deception may actually be considered a positive characteristic to possess in evolutionary terms since it may well increase survival as well as reproductive success and so become a desirable trait. Thus, being deceived by a display and thereby mating with that individual may not be a complete disaster. Of course the other possibility is that art is not acting as a fitness indicator although it has been found that serious and professional visual artists had a

significantly greater number of partners from the age of 18 years than controls (Nettle & Clegg, in press-b) which may indicate that artwork may act as a display of genotypic and phenotypic quality.

Interestingly, the variable which was significant was intelligence despite the fact that the range of the “artists” intelligence scores is small (Table 23). This supports Miller’s (2001) belief that intelligence of the artist can be surmised through a consideration of his/her artwork. From this study it is not possible to know what aspects of the artwork were transmitting information about intelligence, although the multiple regression analyses conducted above indicate that it was not the creativity, attractiveness or interestingness of the artwork. It could be that it was factors such as the spatial arrangement and design of the material and artwork which are indicating intelligence. However, further research is required that asks raters about what aspects of the artwork indicate the various qualities of the artist to them.

7.6. DATING PREFERENCE

The results for which of the “artists” the raters would most like to go out on a date with can be found in Table 50.

**Table 50. Number and Percentage of Raters Who Would Like To Go Out On a Date with Each of the Six “Artists”**

Artist Number	Number of Raters	Percentage of Raters
1	7	13.7
2	7	13.7
3	8	15.7
4	16	31.4
5	10	19.6
6	3	5.9

It can be seen that “artist” number 4 was found to be the individual most often chosen and “artist” number 6 was found to be the least desirable to go out on a date with. To determine whether these results are due to chance or are statistically significant a  $\chi^2$  test was carried out. From these results it appears that there was no statistically significant preference for the “artists” ( $\chi^2 = 11.000$ ,  $df = 5$ ,  $p = 0.051$ ). Nevertheless, this result is only just below significance and so it is worth considering the raters’ preferences in more detail.

A list of the reasons given for choosing a particular “artist” to go out on a date with can be seen in Appendix 17. When the individual “artists” are considered it appears that the raters are consistently choosing the artists on specific characteristics which the artwork is believed to be indicating. Thus, while some are being chosen because they are believed to be creative others are chosen because they appear outgoing, laid back or fun. The most common reasons are to do with the “artist” appearing to be creative, interesting, fun, outgoing, friendly, and easy going with other characteristics such as conscientiousness, caring, sensitive, and attractive also being mentioned. In fact, interesting is one of the most frequently mentioned reasons with creativity coming close behind. This then supports Miller’s (2001) claim that these traits, (as interestingness is correlated with intelligence) are being communicated to observers of artwork and are attracting them to want, at least an initial meeting, with the “artist”.

When correlations were computed between the number of times the “artists” were chosen to go out on a date with and the mean aggregated ratings for scores by raters on the assessed variables it can be seen that there were only three



significant correlations (Table 51). These were for rated creativity, and rated conscientiousness of the “artists”, and rated attractiveness of the artwork with rated emotional sensitivity and physical skill of the “artists” nearing significance. However, when the Bonferroni adjustment was made the significance level became 0.004 and so none of the correlations were significant. Thus, there does not appear to be a significant relationship between the rated characteristics of the “artists” and the number of times they were chosen to go out on a date with by the raters.

**Table 51. Spearman Correlations for Number of Times an “Artist” is Chosen to go Out on a Date with and Mean Aggregated Scores by Raters for Personality and Other Traits**

Mean Aggregate Ratings by Female Raters	Number of Times Male “Artist” Chosen to go Out on a Date With	
Creativity of the “artist”	$\rho = .812$	$p = .050$
Intelligence of the “artist”	$\rho = .667$	$p = .148$
Emotional Sensitivity of the “artist”	$\rho = .754$	$p = .084$
Outgoingness of the “artist”	$\rho = .493$	$p = .321$
Conscientiousness of the “artist”	$\rho = .899$	$p = .015$
Friendliness of the “artist”	$\rho = .493$	$p = .321$
Interestingness of the “artist”	$\rho = .667$	$p = .148$
Physical attractiveness of “artist”	$\rho = .551$	$p = .257$
Physical skill of the “artist”	$\rho = .754$	$p = .084$
Attractiveness of artwork	$\rho = .841$	$p = .036$
Interestingness of artwork	$\rho = .667$	$p = .148$
Creativity of artwork	$\rho = .667$	$p = .148$

When the actual scores on the personality, creativity and intelligence scales were correlated with the number of times the “artists” were chosen to go out on a date with there was no significant correlations (Table 52).

**Table 52. Spearman Correlations for Number of Times an “Artist” is Chosen to go Out on a Date with and Actual for Personality and Other Traits**

Actual Male “Artists” Scores	Number of Times Male “Artist” Chosen to go Out on a Date With	
Creativity Continuum Mean Score	$\rho = .290$	$p = .577$
Full-4 Scale IQ	$\rho = .464$	$p = .354$
Neuroticism Score	$\rho = -.377$	$p = .461$
Extraversion Score	$\rho = -.029$	$p = .957$
Openness Score	$\rho = -.632$	$p = .178$
Agreeableness Score	$\rho = .058$	$p = .913$
Conscientiousness Score	$\rho = .441$	$p = .381$

Nevertheless, when the most common reasons for going out on a date with the “artists” (Appendix 17) were identified and considered in relation to the five factor model using McCrae & Costa’s (1987) factor loadings of adjectives, it was demonstrated that there is evidence of some accuracy although raters may not be choosing the artist who scores highest on the desired qualities (Table 53). For example, “artist” 2 was chosen due to a belief that he was outgoing and fun which implies high extraversion and whilst he had a high extraversion score he was not the artist who scored the highest in extraversion (Table 26). A further example can be seen with artist 3 who was chosen by a number of raters because

he was believed to be calm/laid back which would equate with low neuroticism (McCrae & Costa, 1987). Again although “artist” 3 does have a low neuroticism score two other male “artists” actually had lower scores (Table 26). Therefore, whilst number 3 was relatively low in neuroticism he was not the lowest but it appears that, since he was the only one who was chosen for this characteristic (Appendix 17), his artwork conveyed him as the least neurotic individual. Furthermore, it should be noted that although there appears to be more inaccuracy for “artist” 5, his scores for openness and agreeableness are compared to the norms in Table 27, which are only very rough norms as discussed above, and so the scores for these two traits may actually suggest higher levels as assessed by the raters if more accurate norms were available. Thus, it appears that although the raters are able to distinguish between levels of a personality trait (high, medium, low) they are either unable to identify the more subtle differences between “artists” within a level or they can do this but do not necessarily want the “artist” who scores the highest in the desired trait. Reasons for this will be discussed below in the conclusion.

Table 53 also demonstrates that for those “artists” that were chosen for their perceived creativity (“artists” 1, 4 and 5) this interpretation of the raters was accurate for their openness scores but not in terms of their creativity continuum scores. Thus, it appears that raters may be able to more accurately assess an “artists” creative potential (openness) whereas it is much harder for them to assess a person’s own estimate of their creative ability (creativity continuum score). This may be because self-rated creative ability will be much more

influenced by such things as self-esteem, previous experience and motivation and so is a more subjective concept.

**Table 53. Female Raters’ Reasons for Choosing which Male “Artists” to go out on a Date with and their Relationship with the “Artists” Actual Scores.**

Artwork Number	Most Common Reasons For Choosing Artist to go out on Date	Suggested Level of Actual Trait	Actual scores of Artists
1	Creative	High self-rated creativity	*Creativity Continuum score 3.4 (very low)
		High Openness	Openness 92/100 (high)
	Interesting	High Intelligence	FSIQ 136 (very superior)
2	Outgoing/ fun	High extraversion	Extraversion 93/100 (high)
3	Calm/laid back	Low neuroticism	Neuroticism 43/100 (low)
	Fun/outgoing	High extraversion	*Extraversion 57/100 (medium low)
4	Creative	High self-rated creativity	*Creativity continuum score 2.1 (average)
		High openness	Openness 89/100 (medium high)
	Interesting	High Intelligence	FSIQ 134 (very superior)
	Fun/sociable	High extraversion	*Extraversion 51/100 (medium low)
5	Creative	High self-rated creativity	*Creativity continuum score 3.0 (low)
		High openness	*Openness 79/100 (medium low)
	Fun	High extraversion	Extraversion 99/100 (high)
	Friendly	High agreeableness	*Agreeableness 71/100 (medium low)
6	Interesting	High intelligence	FSIQ 123 (superior)
	Withdrawn/hurt/unhappy	High neuroticism	Neuroticism 95/100 (high)
	Fun	High extraversion	Extraversion 77/100 (high)

Note: \* Responses by raters are inaccurate.

Levels of personality traits as defined by norms presented in Table 27 of main text and level of Full Scale IQ (FSIQ) as defined by The Psychological Corporation (1999)

Furthermore, there was found to be some significant differences between those who chose the artist to go out on a date with and those who did not in the scores they assigned the artists on their various characteristics (Appendices 18 & 19). For all the significant differences it was found that those who chose the artist to go out on a date with had a higher median for the traits rated than those who did not. Therefore, those who chose artist 3 scored him significantly higher on creativity, interestingness, physical attractiveness, and emotional sensitivity. Those who chose artist 4 scored him significantly higher on physical attractiveness and outgoingness, the raters who chose artist 5 scored him significantly higher on creativity, interestingness, physical attractiveness and outgoingness, and those who chose artist 6 scored him significantly higher on interestingness (Appendices 18 & 19).

The fact that for artists 3, 4 and 5 there was a significant difference in physical attractiveness scores with those choosing to go out on a date with these artists scoring them more highly on physical attractiveness than those who did not choose them is surprising since this was a particularly difficult trait to rate and in the pilot study participants appear to be divided as to whether or not they had a clear visual image of the “artist”. Interestingly, “artist” number 4 was the only one to have raters mention his physical appearance as a reason for wanting to go out on a date with him (Appendix 17). Since number 4 had the highest mean rated score for physical appearance it may be that his artwork provoked the most vivid image of the “artist”. However, the medians of all “artists” for physical attractiveness for those choosing the “artist” to go out on a date with were all equal or higher than those not choosing the “artist” (Appendix 19). This suggests

that whilst some raters reported a difficulty in scoring “artists” on this feature it may actually be that unconsciously they are in part choosing the “artist” whom they imagine would be the most physically attractive.

Interestingly, although common reasons for choosing “artist” number 1 were creative and interesting, the medians for those who did and did not choose this “artist” for both variables were the same. Thus, it appears that although those who did not choose him, in general, believed that he was high in interestingness and creativity these characteristics may not have been what they were looking for in a mate or that they found these in combination with other desirable traits in other “artists” which they did not identify in “artist” number 1. A similar conclusion can be drawn for “artist” 2 since although he was recognised as high in outgoingness by the majority of raters this did not necessarily mean that he was chosen to go out on a date with despite this often being considered a desirable trait (Buss et al., 1990). Furthermore, for some “artists” there may have been a significant difference on a characteristic with those choosing the “artist” rating them higher on the trait but this was not a common reason given by the raters for wanting to go out on a date with the “artist”. For example, those choosing “artist” 3 rated him significantly higher on creativity than those who did not choose him to go out on a date with (Appendix 18) but creativity was not a trait that was commonly mentioned as a reason for going out on a date with this “artist” (Appendix 17). This analysis highlights the fact that it is not a simple case of those “artists” being high in creativity, or other traits specified by Miller (2001), who automatically gain more matings but rather that individual mate

preferences are influential and that certain combinations of characteristics may be more attractive than others.

### **7.6.1. SUMMARY OF DATING PREFERENCE**

To conclude this section, it appears that whilst rated creativity and intelligence may be important in deciding whether to go on a date with someone, as emphasised by Miller (2001), personality traits appear to be equally if not more so desirable. Moreover, different individuals appear to be attracted by different qualities that they perceive to belong to the “artists”. Thus, rather than there being a clear linear relationship between increasing creativity and intelligence, etc, and numbers of individuals attracted to the “artists” the participants appear to have selected the “artists” on particular traits which they value most when considering going on a date with someone. Moreover, although there is a lack of statistical accuracy there is an indication from the qualitative analysis that observers of artwork may be able to distinguish between levels of personality traits but not to make or choose not to make subtle distinctions between individuals on the same level. Thus, there is some evidence that artworks act as fitness indicators in mate choice decisions.

### **7.7. CONCLUSION**

Two aims of this study were to identify which qualities of the “artists” were reflected in the artworks and which aspects of the artwork were indicating these qualities. Results of the multiple regression analysis found that very few of the rated qualities of the “artists” were predicted by the three rated variables of the artwork; creativity, attractiveness and interestingness. In fact, attractiveness did

not indicate any of the rated variables for the “artists”, which argues against Miller’s premise that it is the aesthetic judgement of the art that indicates the qualities of the artist. It is also interesting to note that there was however an effect of attractiveness of the artwork on the frequency with which the “artist” was chosen to go out on a date with. Thus even though, according to the results of the multiple regression analysis, attractiveness of the artwork is not a significant predictor of any of the “artists”’ actual qualities the fact that the raters found the artwork attractive was enough to influence them in deciding to go out on a date with the “artist”. Furthermore, it appears that the perceived attributes of the artworks do not reflect any of the actual qualities of the “artists”. However, there may be other characteristics of the artwork not measured in this study that do indicate the “artists”’ qualities.

Results for consensus demonstrated that there was significant inter-rater agreement for all rated variables apart from physical attractiveness of the “artist”. The levels of inter-rater agreement for the personality variables parallels the findings from other studies that suggest that consensus is a product of the visibility of the trait so that the more visible a trait is found to be the greater the consensus (Blackman & Funder, 1998, Funder & Dobroth, 1987). Moreover, reflections of an individual’s personality through other extended phenotypes, such as bedrooms and offices (Gosling et al., 2002) and personal websites (Vazire & Gosling, 2004), have also found similar levels of consensus as in this study.



There was found to be significant accuracy for intelligence. This supports Miller's (2000b) claim that creative products primarily arose to advertise intelligence to potential mates. However, a consideration of the accuracy results for the other traits suggests that the consensus among the raters was not based on accurate information. This would suggest that art is either not acting as a fitness indicator or if it is it is being inaccurately assessed on the majority of variables leading to possible poor choices of mate. It is also possible that there is some deliberate deception so that the "artists" projected a desired image through the artwork rather than a more realistic impression. This possibility has been discussed in more detail above but briefly it may be that there are advantages to mating with someone high in deception although this would appear to be a high risk strategy.

One explanation for the difference in consensus and accuracy results is that consensus was based on shared inaccurate stereotypes among the raters (Blackman & Funder, 1998). Another is that statistical power in this study is low so that it becomes difficult to draw inferences if a result is found to be non-significant as this could be due to low numbers of artworks being rated.

However, the lack of statistical accuracy may also be due to the product being assessed. An accurate judgement is a product of the attributes and behaviour of the participant and the observations and perceptiveness of the rater (Funder, 1995). However, when visual art acts as an extended phenotype of the individual behavioural cues are either non-existent or extremely limited. Moreover it is possible to either fake or enhance personality clues, whether consciously or

unconsciously, within the artwork and thus it may be very difficult or impossible to accurately judge an individual's personality through this medium. Furthermore, since art appears to have a relatively late evolution it may be that the ability to assess artworks for the qualities of the artists is not fully developed as suggested by Johnstone & Grafen (1993).

Nevertheless, the more qualitative data suggests that there is some accuracy in interpretation of what the "artists" are expressing although the raters do not always identify the aspects of the "artists" that they score most or least highly on. For example, the "artist" who has the lowest score on neuroticism may not be identified as being low on neuroticism although other artists who have low neuroticism scores may be identified as having low scores. In view of the possible problems with assessing artworks discussed above the fact that there appears to be some accuracy is quite striking.

The data on dating preference demonstrates the complexity of mate choice. There was found to be no clear linear relationship between any of the characteristics of the "artists" and choice of who to go out on a date with. Moreover, raters varied as to their reasons for choosing an "artist" depending on the personality traits and characteristics they valued most highly. It is possible that raters are influenced by their own personalities and may be attracted to individuals who appear more or less similar to themselves. The relationship between the projected and actual personalities of the "artists" and the personalities of the raters requires further exploration.

Furthermore, it appears that there are not only no significant relationships between dating frequency and the rated characteristics of the “artists” but also when the actual scores of the “artists” are considered there was found to be no significant association. This thereby suggests that the attributes of the artwork do not indicate either the inferred qualities of the “artists” or are they reflective of the “artists” actual qualities.

Nevertheless, there is evidence from the qualitative data that raters are choosing “artists” who score highly on the desired attributes but that they are not choosing the “artists” who score most highly thereby explaining the lack of statistical significance. Thus, it appears that raters are able to judge “artists” as to their level of a trait (high, medium, low) but not make more subtle distinctions within each level. However, it may not be necessary to be able to judge these subtle distinctions since in general people do not claim to want a mate who scores 10 out of 10 on even the most valued of characteristics but rather use their own mate value as an indication of what they can expect from a potential mate (Fletcher et al., 2004). Furthermore, research on trade offs in mate preferences suggest that participants only require certain amounts of even the most desired characteristics and once these requirements are fulfilled they then look for other traits to be present (Li et al., 2002).

Moreover, whilst the traits that have been chosen by the participants in this study are considered desirable within a mate due to evidence of “good genes” or parental investment, there are also costs to many of these attributes. For example, high extraversion has been found to be associated with higher risk

taking leading to hospitalisation (Nettle, 2005). Furthermore, high openness and creativity are closely correlated with the Unusual Experiences scale which is associated with schizotypy which, when it leads to psychotic illness, reduces reproductive success (Nettle & Clegg, in press-b). Furthermore, even a trait such as agreeableness, which appears to clearly be a positive trait in a mate, if too high, may lead to excessive input into the needs of others to the detriment of the individual's fitness (Nettle & Clegg, in press-a). Thus, selecting an individual too high in a particular trait may lead to costs not only in their reproductive success but also to one's own.

Before concluding this chapter a consideration of the creativity continuum is required since the use of the creativity continuum in this study may provide further validation for it as a measure of creativity. One way of identifying this is to consider its correlation with Openness to Experience since this trait has been found to be closely associated with creativity (McCrae, 1987, McCrae & Costa, 1997). Within this study it was found that the creativity continuum mean scores were not significantly correlated with openness for the male "artists". However, when the relationship between the creativity continuum and openness to experience was calculated for the female "artists" (whose results were not discussed due to the low numbers of male raters) there was a significant relationship ( $\rho = -0.886$ ,  $p = 0.019$ ). It may be that this finding for the male "artists" is a product of the particular individuals who participated and this caused the non-significant result, although the reasons for this are difficult to ascertain from the available information on the male "artists". The fact that in the first study the relationship between openness and creativity continuum mean

scores was significant for both males ( $p = -0.341$ ,  $p < 0.001$ ) and females ( $p = -0.230$ ,  $p = 0.001$ ) suggests that this may be the case.

Within this study there was found to be no accuracy between the creativity continuum scores of the “artists” and the scores for how creative the raters believed the “artist” to be. These results may appear to invalidate the creativity continuum. However, there is likely to be a difference between self-rated creative ability (as measured by the creativity continuum) and creative ability as judged by other members of society. The creativity continuum considers a wide range of situations within which the person may be creative whereas the raters were judging the much narrower field of creativity of artwork. Furthermore, from the Definitions of Creativity study there was found to be a generally limited view of creativity predominantly applying to The Arts. If this is the view of the “artists” then despite being creative in other aspects of their lives they may rate themselves as low in creative ability. Also, the “artists” ratings may be influenced by factors such as self-esteem and previous experience. Moreover, the raters’ views of what constitutes a creative piece of art may be affected by their age and experiences although interestingly there was relatively high consensus on ratings of creativity of the “artists”. Thus, whilst the creativity continuum may be a valid measure of self-rated creativity there appear to be problems with extrapolating the scores to actual artistic ability as judged by at least some members of society. Nevertheless, the fact that the statistical power is low due to the small numbers of artworks rated makes it difficult to draw inferences from non-significant results. Thus, further research expanding the

numbers of artworks without inducing rater fatigue is required to accurately assess the validity of the creativity continuum.

When taken together the findings from the first study, “Definitions of Creativity” (Chapter 5) and this second Fitness Indicator study provide some support for the creativity continuum as a valid measure of self-rated creative ability. It demonstrated a normal distribution and unidimensionality in a general population sample. It also was significantly correlated with number of interests the participants actively engaged in, the majority of which could be considered creative activities (see Appendix 4). Moreover, the creativity continuum mean scores had a significant relationship with openness to experience in the first study, for both males and females, and in the second study for females.

However, there appear to be problems with the validity of the continuum when its relationship with artistic ability as perceived by others is considered. This may be a product of the continuum covering a wide variety of areas in which one can be creative. Thus, those who considered themselves creative may be so in areas other than art and thus may not have the skills to produce what would be considered a creative piece of art despite possibly having the creative ideas. Nevertheless, it is difficult to draw conclusions regarding the relationship between the creativity continuum and artistic ability from such a small sample of non-artistic individuals. Therefore, to conclude there is evidence that the creativity continuum is a valid measure of self-rated creative ability. However, further research, as discussed in the conclusion (Chapter 11), needs to be carried out to further validate this scale.

### **7.7.1. LIMITATIONS AND FUTURE RESEARCH**

The primary limitation is the low number of artworks that were rated which leads to a lack of statistical strength for the results. The number of artworks was kept to six in an attempt to prevent rater fatigue and thereby improve the accuracy of responses. However, this means that the correlations for accuracy need to be very large to gain statistical significance. Thus, refinement of the questionnaire is required so that more artworks can be rated without inducing rater fatigue.

Furthermore, the raters only considered one artwork by each of the artists. In reality people are able to view a number of works by an artist thus possibly providing them with a more comprehensive perspective on the artist's qualities. Furthermore actual artists may be far more skilled in expressing their ideas through their art. Thus a further study could use professional, amateur and non-artist's artworks.

This study only considers artworks produced by men and rated by women. A parallel study was run using artworks by females and men as the raters. However, there was a lack of male volunteers to rate the artworks that would have meant a reduction in the validity of the results. Research of this type typically recruits fewer male participants and so ways of encouraging them to engage in such studies requires further exploration.

Moreover, this study is centred within a modern Western society where art is closely associated with creativity. However, within many more traditional

societies the purpose of art is ritualistic and production of art and creative expression may not be considered compatible (Dissanayake, 1992, Lubart, 1999). Therefore, the claims within this study cannot be generalised to other societies and cultures. Similar studies are required in other cultures, especially more traditional ones, to identify whether artworks universally act as fitness indicators.

Finally, it is not apparent as to how the raters were able to evaluate the artists' traits through an assessment of the artworks since the multiple regression analysis indicated that the attractiveness, creativity and interestingness of the artwork were not significant predictors of the majority of the artists' characteristics. This area requires further exploration.

To conclude, the results demonstrate that the artworks in this study are acting as accurate indicators of the artists' intelligence and may provide some clues as to the levels of personality traits and creative ability and that this knowledge is used in mate choice decisions. However, these results require replication. Furthermore, other aspects of the sexual selection model require exploration so that the various strands of evidence can be gathered and an overall picture gained in an attempt to support or refute the sexual selection hypothesis of creativity. The next study, considering the personalities of artists and their partners as well as patterns of sexual behaviour of the artists, aims to develop some of the findings from this study and provide a further strand of evidence to support or refute the sexual selection model for visual art.



**CHAPTER 8**  
**PERSONALITY, SEXUAL BEHAVIOUR AND MATING**  
**PREFERENCES**  
**A LITERATURE REVIEW**

**8.1. INTRODUCTION**

The third study within this thesis is an attempt to further test the sexual selection hypothesis of visual art by considering the mating success and actual and potential fertility of visual artists. It will also consider the role that the artist's personality plays in sexual selection since in the previous study raters of artworks were choosing to go out on a date with the artist primarily because of their perceived personality traits. Since sexual selection as applied to visual arts has already been discussed in Chapter 3 this literature review will consider other aspects relevant to this study of personality and sexual behaviour/ attitudes, and personality and mate preferences.

**8.2. PERSONALITY AND SEXUAL BEHAVIOUR/ ATTITUDES**

**8.2.1. Extraversion**

When considering the relationship between extraversion and sexual attitudes there appear to be mixed results. In two separate studies multiple regression analyses found that extraversion was not a significant predictor of sexual attitudes as measured by the short version of the Sexual Opinion Survey (SOS) (this is a measure of erotophobia-erotophilia where an erotophilic disposition suggests a more open, liberal individual who enjoys sexual variety (Fisher et al.,

1988, McCrae & Costa, 1987)) (Fernandez & Castro, 2003, Wright & Reise, 1997). However, Heaven et al (2000) found that extraversion was a significant, positive predictor of the attitudes of sexual curiosity for women and sexual excitement for both men and women, and a significant, negative predictor of sexual nervousness in men.

However, these results for sexual attitudes may not be generalisable to a general population since the samples consisted of students. Moreover, Fernandez & Castro (2003) used a Spanish sample whereas Heaven et al's (2000) sample was from Australia. The results of the two studies may therefore be influenced by cultural factors.

In fact, Schmitt (2004) considered the relationship between the Five Factor Model of personality and risky sexual behaviours cross-culturally, using predominantly student samples. Overall extraversion was significantly positively correlated with both relationship infidelity and sexual promiscuity. Although the correlations were larger for promiscuity than infidelity both were small. Furthermore, the results between extraversion and promiscuity were found across nearly all cultures whereas there was much greater cultural disparity for extraversion and relationship infidelity (Schmitt, 2004). However, the correlations were so small for both sexual behaviours that the fact that they are significant may be the product of the large overall sample size.

However, Schmitt (2004) used the seven sexuality factors from Schmitt & Buss's (2000) study. Thus participants rated themselves on the adjectives as compared

to others that they know. This appears to be a rather subjective measure since each individual will be using a different base line depending on the people that they know and their interpretation of the adjectives. In fact, cultural norms for sexual behaviours may be very different which raises the question of the validity of the scale across cultures particularly since the scale was developed using participants from the USA. Moreover, it could be argued that this is not a very accurate measure of behaviour since it is not looking at frequency of particular acts and does not clearly define the terms. This highlights the need to make the distinction between attitudes and behaviours since an expressed attitude may not lead to the related behaviour and could actually result in the opposite behaviour.

Vollrath et al (1999), using a student sample from Switzerland, considered risky sexual behaviour through questions regarding frequency of sexual partners, sex with strangers and unprotected sex with a new partner and the responses were combined into a single scale labelled "risky sexual behaviour". The results showed that extraversion was significantly positively correlated with risky sexual behaviour, although weakly (Vollrath et al., 1999). However, combining the three questions related to sexual behaviours may actually have weakened the correlations. Results from a study by Miller et al (2004) partly support this assumption. They found that whilst extraversion was a significant predictor of number of sex partners by age 20 it did not significantly predict number of sex acts without a condom.

When Vollrath et al (1999) conducted stepwise regression analysis they found that extraversion was not an independent predictor of risky sexual behaviour.

However, Miller et al (2004) found that extraversion was a significant predictor only for number of partners by age 20 and the use of drugs or alcohol before or during sex but not of other risky sexual behaviours. This highlights the importance of looking at individual behaviours to gain a clearer picture of extraversion's role in sexual behaviour. It should be noted that Miller et al (2004) used a community sample whereas the others tended to use student populations. Therefore, their study may be more generalisable to the general population.

Wright & Reise (1997) consider the effect of personality on sociosexuality in Caucasian and Asian college students. Unrestricted sociosexuality indicates someone who is likely to engage in sex outside the context of a committed relationship. However, they modified the Sociosexual Orientation Inventory (SOI) to include a wider range of behaviours and so appear to be capturing risky sexual behaviours and attitudes as opposed to specifically sociosexuality. When a multivariate analysis was conducted it showed that regardless of ethnicity extraversion was found to be a significant, direct predictor of unrestricted sociosexuality (Wright & Reise, 1997). However, it should be noted that the Caucasian and Asian samples were both from the same university in the USA. Thus, the cultural differences may not be as great as if they had come from different countries.

Interestingly, a study by Schmitt & Buss (2001) found that those individuals high in extraversion were significantly more likely to receive sexual advances from other individuals but that there was no significant correlations between

extraversion and attempts at attracting members of the opposite sex or responding to attempts made on them (Schmitt & Buss, 2001). Thus, although extraverts do appear to engage in greater amounts of sexual behaviour they do not seem to seek this with individuals in established relationships or to gain increased sexual liaisons by infidelity. Since extraversion has been found to be significantly positively correlated with sexual attractiveness (Schmitt & Buss, 2000), it may be that extraversion is an attractive enough trait that such individuals high in this do not need to gain already attached mates with the added costs that this would bring, such as a high risk of retaliation from the cuckolded partner.

However, a study by Nettle (2005) only partly supports this conclusion. While it was shown that for both men and women extraversion demonstrated a significant linear relationship with lifetime number of sexual partners, it was found that for men there was also a significant, positive relationship between extraversion and infidelity. For highly extraverted women it appears that while their higher number of sexual partners is not due to them being unfaithful it is associated with them being significantly more likely to end a relationship (Nettle, 2005). Thus extraverts appear to be more likely to be successful in attracting mates.

Thus, it seems that levels of extraversion have a relationship with specific sexual behaviours such as increased number of partners but less so with others such as infidelity. In fact, extraverts appear to have a higher probability in engaging in promiscuous behaviour but with reduced risk to themselves since they appear to protect themselves from venereal disease and angry spouses.

### 8.2.2. Neuroticism

From studies by Heaven et al (2000) and Fernandez & Castro (2003) it appears that neuroticism is one of the most significant predictors of sexual attitudes. Heaven et al (2000) found that neuroticism was a significant predictor of sexual guilt so that the more neurotic the individual the greater the sexual guilt they experienced. However, for the other sexual attitudes there were gender differences. For males those high in neuroticism showed greater sexual curiosity and excitement whereas women high in neuroticism experienced lower levels of sexual satisfaction (Heaven et al., 2000). Moreover, Fernandez & Castro (2003) found that for both male and female Spanish students the more neurotic they were the more positive their attitude towards experiencing physical attraction towards a member of the opposite sex.

However, Wright & Reise (1997) found that more neurotic Asians are significantly more erotophobic and Caucasians higher in neuroticism are significantly more erotophilic (Wright & Reise, 1997). This suggests that the relationship between neuroticism and sexual attitudes is moderated by culture.

A consideration of the association between neuroticism and risky sexual behaviours tends to suggest little if no relationship. In Miller et al's (2004) study they found that neuroticism did not predict any risky sexual behaviours and this was also the case for a study by Vollrath et al (1999). Schmitt (2004) for his cross-cultural sample also found no significant correlation between neuroticism and sexual promiscuity. However, he did find a significant positive correlation

between neuroticism and relationship infidelity for women and men although these were very small and therefore possibly artefacts of the large sample size. Moreover, cultural factors appeared to play a role in mediating the effects between neuroticism and sexual behaviour. However, as discussed above the measure of infidelity and promiscuity may be more a measure of attitudes rather than sexual behaviour. Nevertheless, a meta-analysis found significant positive correlations between neuroticism and number of sexual partners (Hoyle et al., 2000), although these results came from only two and three studies respectively making it difficult to make generalisations.

In another study it was found that although neuroticism was not significantly correlated with attempts to poach other people's partners, if neurotic individuals did receive poaching attraction attempts they tended to go along with them (Schmitt & Buss, 2001). From this study it therefore appears that while neurotic individuals will not actively seek infidelity if it is offered to them they will accept. This may be explained by the conflict for neurotic individuals between high sexual desire, low sexual satisfaction, and high sexual guilt found by Eysenck (1976) since not actually initiating a sexual infidelity may take away some of the guilt whilst accepting an offer may give them the hope that they may achieve greater satisfaction in this new liaison.

Thus there appears to be a significant effect of neuroticism on sexual attitudes. However, while possibly desiring more sexual experience in general this does not lead to greater numbers of sexual partners although there may be evidence of an increased likelihood of engaging in infidelity. This is relevant to the current

study on artists and their sexual behaviours since creative individuals have been found to be higher in neuroticism (Gotz & Gotz, 1973, Nowakowska et al., 2004, Walker et al., 1995) which would suggest that on the whole their level of neuroticism will not influence their mating success although there may be evidence of increased extra-marital affairs.

### **8.2.3. Agreeableness**

When Wright & Reise (1997) correlated erotophilia with agreeableness they found a significant although weak negative correlation. This result was also found in a study by Schmitt & Buss (2000). However, these results are correlational and when Fernandez & Castro (2003) conducted multiple regression analyses they found that agreeableness was not a predictor of sexual attitudes. Furthermore, a study by Heaven et al (2000) supported these results. Thus, agreeableness does not appear to independently predict sexual attitudes.

Nevertheless, agreeableness does appear to be a significant predictor of sexual behaviour. Schmitt (2004) found cross culturally some of the largest significant negative correlations (although these were still low) between agreeableness and both relationship infidelity and sexual promiscuity although the relationships were on the whole stronger for the former (Schmitt, 2004). Moreover, culture had little influence on these results. The results for infidelity are supported by correlations from a study by Schmitt & Buss (2001) who found that individuals low on agreeableness were significantly more likely to attempt to poach a mate and to accept poaching attempts made on them. Moreover, a meta-analysis of



personality and sexuality again supported the significant negative relationship between agreeableness and risky sexual behaviour (Hoyle et al., 2000).

Miller et al (2004) found that agreeableness significantly negatively predicted a number of risky sexual behaviours including numbers of sexual partners, and being unfaithful. However, for sex outside the primary relationship the effect was significant for men but not women (Miller et al., 2004). The results from Vollrah et al (1999) study support the predictive relationship between low agreeableness and risky sexual behaviours.

Thus, while agreeableness does not appear to independently predict sexual attitudes there is clear evidence that it does predict sexual behaviours. What is apparent is that individuals low in agreeableness are likely to be more promiscuous and unfaithful.

#### **8.2.4. Conscientiousness**

Wright & Reise (1997) measured sexual attitudes and found that the only significant correlation was for Caucasians low in conscientiousness being more erotophilic. However, they found that conscientiousness was not predictive of erotophilia. These results may be due to conscientiousness, according to Fernandez & Castro's (2003) results, being only associated with the homosexuality part of the SOS measure, with those low in conscientiousness having more positive attitudes towards homosexuality. This again highlights the necessity of looking at individual attitudes to understand the relationship between personality and sexual attitudes more clearly.

In fact, Heaven et al (2000) did consider individual sexual attitudes and found that conscientiousness was significantly correlated with rejection of group sex and a lower frequency of desired sexual intercourse. Furthermore, low conscientiousness was found to be a significant predictor of increased sexual excitement for women. It did not significantly predict sexual curiosity, sexual guilt, sexual nervousness or sexual satisfaction (Heaven et al., 2000).

With respect to sexual behaviours there is correlational evidence that conscientiousness is associated with some sexual behaviour. In the case of relationship infidelity and sexual promiscuity the patterns are similar to those of agreeableness (Schmitt, 2004, Schmitt & Buss, 2001). For unfaithfulness Schmitt (2004) found that across all cultures less conscientious individuals are significantly more likely to engage in sexual behaviour outside of their primary relationship. Moreover, Schmitt & Buss (2001) found that those low in conscientiousness were not only significantly more likely to accept mate-poaching attempts made on them but also had a greater probability of engaging in mate-poaching attempts themselves. These results are understandable when it is considered that the personality characteristics of an individual low in conscientiousness are of being unreliable, thoughtless and weak willed (McCrae & Costa, 1987).

Furthermore, Buss & Shackelford (1997) found that husbands low in conscientiousness believed themselves to be more likely to participate in flirting and kissing a person other than their wife. Furthermore, a wife's low

conscientiousness was a consistent indicator of her increased likelihood of participating in nearly all types of unfaithful behaviour and the husbands appear to be aware that this was an accurate indicator of infidelity (Buss & Shackelford, 1997). Thus, a low level of conscientiousness appears to be strongly and consistently associated with increased infidelity. This relationship is partly supported in a study by Schmitt & Buss (2000) that found a significant positive correlation with relationship exclusivity for women but not men.

It also appears that those low in conscientiousness engage in more sexually promiscuous behaviour although culture does appear to mediate this relationship (Schmitt, 2004). However, Miller et al (2004) found that conscientiousness was not a significant predictor of number of partners by 20, and sex outside of the primary relationship although the associations were all in a negative direction.

Therefore, the findings for conscientiousness and sexual attitudes and behaviours are mixed. Conscientiousness does appear to have a relationship with some sexual attitudes and to be associated negatively with promiscuity and infidelity. Interestingly, creative individuals have been found to be lower in conscientiousness (Furnham & Chamorro-Premuzic, 2004, Nowakowska et al., 2004, Walker et al., 1995), which would suggest that they might engage in more promiscuous and unfaithful behaviour.

#### **8.2.5. Openness**

The adjectives that load most strongly on openness to experience, such as imaginative, curious, daring, prefer variety, liberal and untraditional (McCrae &

Costa, 1987), would suggest that openness would be positively related to a variety of sexual attitudes and behaviours. However, Heaven et al (2000) did not find that openness was correlated or a significant predictor of sexual curiosity, excitement or satisfaction. In fact, the only time openness acted as a significant predictor of sexual attitudes was with sexual nervousness for men so that men who were high in openness were less sexually nervous (Heaven et al., 2000).

However, in another study openness to experience was significantly, positively correlated with sexual orientation for both men and women so that the more open an individual is the more inclined they are toward homosexuality or bisexuality (Schmitt & Buss, 2000). This is a particularly relevant result to artists since they are generally found to be high in openness to experience and thus these findings would therefore question the sexual selection hypothesis of visual art since from an evolutionary perspective those more inclined towards homosexuality are unlikely to be reproductively successful in terms of numbers of biological children.

Two other studies found that openness was significantly positively correlated with and acted as a significant positive predictor of erotophilia (Fernandez & Castro, 2003, Wright & Reise, 1997). Thus the more open an individual the greater their disposition to erotophilia. Furthermore, a husband's estimate that he will engage in a date, one night stand, and brief affair was significantly, positively related to his openness scores (Buss & Shackelford, 1997). However, openness did not predict a wife's likelihood of engaging in unfaithful behaviour.

Nevertheless, Schmitt (2004) found considerable cultural differences between openness and relationship infidelity and sexual promiscuity. For relationship infidelity there was a very weak but significant negative correlation with openness for men and a zero correlation between these two variables for females. Furthermore for the significant correlations the direction of the relationship varied depending on the region. This weak and inconsistent relationship between openness and infidelity can also be seen in the results from the study by Wright & Reise (1997). When they correlated personality with sociosexual orientation the correlations for different subsections of the sample varied as to whether they were positive or negative and the only significant correlation was for females and this was positive but very weak (Wright & Reise, 1997).

Support for the lack of a relationship between openness and infidelity comes from a study by Schmitt & Buss (2001) who found that individuals high in openness did significantly receive more mate-poaching attraction attempts but that the correlations between openness and poaching attempts made or accepted were small and non-significant. Thus, as with those individuals high in extraversion, those high in openness may be more attractive as mates but do not engage in infidelity possibly due to the high costs involved and the fact that they do not need to as they are able to attract unattached individuals relatively easily. This is partly supported by findings that more open women were considered significantly more sexually attractive although this was not found for men (Schmitt & Buss, 2000).

When the relationship between openness and sexual promiscuity was considered in Schmitt's (2004) study the association was slightly stronger than for infidelity but still weak and inconsistent across cultures. Overall the correlation for both men and women was positive and significant but very weak ( $r = 0.04$ ,  $p < 0.001$  and  $r = 0.05$ ,  $p < 0.001$  respectively). For those samples where the relationship was significant the relationships were conflicting.

Hoyle et al's (2000) meta-analysis found no significant relationships between openness and number of partners. This is supported by the study by Miller et al (2004) who found that openness was not a significant predictor of number of partners by 20 or sex outside the primary relationship.

Thus, despite the apparent compatibility of openness to engaging in increased sexual behaviours and to having liberal sexual attitudes this does not appear to be the case. On the whole the correlations are small and appear to be strongly influenced by cultural factors. This personality domain is particularly relevant to this study due to the close association of openness to artistic personalities. Thus, it will be interesting to see whether levels of openness of the artists reflect the pattern of correlations for sexual behaviours found in previous studies on more general population samples.

#### **8.2.6. Summary**

Extraverts are more promiscuous but not unfaithful and appear to protect themselves against the costs of increased sexual activity. This may be easier for them to do due to the association between such personality types and perceived

attractiveness, which may allow them to have easier access to sexual partners. Interestingly those low in agreeableness show the opposite pattern of possible increased risk to themselves when engaging in promiscuous and unfaithful behaviour thus supporting this hypothesis since those low in agreeableness and therefore perceived attractiveness may engage in more costly behaviour to gain access to mates.

The other three personality domains of the Five Factor Model do not appear to play a significant role in sexual behaviours. Neuroticism appears to predict sexual attitudes but not behaviour. Moreover, the correlations between sexual behaviours and conscientiousness and openness are often small and contradictory.

However, it should be remembered that the majority of correlations between sexual behaviour and attitudes with personality variables are weak and that considerable variance is accounted for by other factors such as culture and gender differences. Nevertheless, the results are also influenced by the use of different measures of sexual activity and the combination of specific behaviours into sexual behaviour measures which may hide correlations with individual items. Moreover, the use of the Five Factor Model in understanding the influence of personality on sexual behaviours and attitudes is relatively recent. Thus it is difficult to draw conclusions until further work using this model and individual items on sexual behaviour measures is carried out.

### **8.3. PERSONALITY AND MATE PREFERENCE**

Considerable research in the domain of mate preferences has found that certain characteristics are consistently identified and valued as important in potential and actual mates and that some of these cut across cultures although differences do occur within and between the sexes, in different societies, in different mating contexts and in varying environments (Buss, 1989, Buss et al., 1990, Buss & Barnes, 1986, Buss et al., 2001, Fletcher et al., 1999, Goodwin, 1990, Hester & Rudolph, 1994, Kenrick et al., 1993, Marlowe, 2004, McGinnis, 1958, Sprecher & Regan, 2002, Toro-Morn & Sprecher, 2003). From an evolutionary perspective particular personality characteristics are important for solving specific problems of survival and reproduction (Buss, 1991). Buss (1991) suggests that conscientiousness acts as an indicator of trustworthiness, agreeableness will lead to cooperation and altruistic behaviour, surgency (or extraversion) enables individuals to climb the social hierarchy and increase social networks, emotional stability indicates an individual's ability to cope with stress, and a person high in openness suggests someone who is innovative and good at problem solving (Buss, 1991).

In fact, the primary theory to explain the need for specific personality traits in mates and the differences for the levels of these among individuals is parental investment (Trivers, 1972). This has already been discussed in some detail in Chapter 3 but to place it into context here, those who invest highly in offspring should require characteristics in a mate that ensure resources are available and consistently provided and that their mate is faithful so that the resources do not have to be spread out elsewhere and that if they are providing the resources then



they are not providing them to offspring who are not genetically related to them. Those who do value resources highly should therefore value personality traits such as extraversion, conscientiousness and openness in potential mates for their ability to negotiate hierarchies (Botwin et al., 1997) and thereby increase their status and thus availability of resources. However it is also important to not only ensure that a mate has access to resources but that they are likely to share those resources. Therefore, agreeableness, with its characteristic of generosity, high conscientiousness and low neuroticism would suggest an individual that was easy to get along with and likely to share resources (Kenrick et al., 1993). Moreover, high agreeableness, high conscientiousness, low neuroticism and high extraversion, with its characteristic of warmth, would indicate a person who would provide high levels of emotional and practical support which is also necessary for successful rearing of a family (Fletcher et al., 2004).

The other important attribute for those who invest highly in offspring is sexual faithfulness. As has been discussed above, traits such as high conscientiousness, agreeableness and extraversion would suggest someone who is likely to be more faithful and so these traits would also be valued in prospective mates by high investing individuals.

However, some individuals are less focused in investing in offspring but may maximise their reproductive success by increasing their number of matings. In this situation desired traits in potential mates are those that are likely to indicate that an individual will want to engage in sexual activity without having known the person for any great length of time and who will not want a committed

relationship. Therefore, personality traits such as low agreeableness, low conscientiousness and high extraversion will be particularly valued. Furthermore, it may be that individuals seeking short-term matings may be seeking “good genes” and so high openness and low conscientiousness (with their associations with creativity and intelligence), high extraversion (with its relationship with managing social hierarchies and therefore gaining status), as well as low neuroticism may be valued in this context. Furthermore, it has been suggested that females who engage in short-term matings may be motivated to do so to gain immediate access to resources and/or to assess the man as a long-term partner (Buss & Schmitt, 1993). In this situation the personality traits valued by those wanting partners to invest highly are most likely to be valued.

It is also relevant to mention here the fact that female fertility and reproductive value are strongly age-dependent and therefore males should prefer females who demonstrate indicators of youth such as smooth skin, good muscle tone, and lustrous hair (Buss, 1989) in other words are physically attractive. However, certain personality traits may contribute to the perception of a person as being physically attractive. For example, there has been found to be a relationship between physical attractiveness and extraversion (Albright et al., 1988) and this may also apply to those individuals high in agreeableness. Furthermore, someone high in extraversion tends to be considered to be high in energy, which may also give the impression of a youthful appearance. Thus, men may find that they are more attracted to women high in extraversion and agreeableness because of their apparent physical attractiveness and youth. However, this relationship would not be predicted for women since male fertility cannot be accurately

assessed from their physical appearance (Buss, 1989) although women may value these personality traits for other reasons as discussed above.

The next section of this chapter will therefore consider the empirical evidence for the above relationships between personality and mating preferences with reference to the length of the relationship, cultural influences, trade-offs, and gender differences and similarities.

### **8.3.1. SEX DIFFERENCES AND SIMILARITIES FOR PREFERENCES IN PERSONALITY**

Buss & Barnes (1986) found that while personality traits were the most valued characteristics by the sample as a whole, married women were found to significantly prefer personality traits more than married men that indicated more agreeable and conscientious partners. Married men on the other hand did not demonstrate a significantly greater preference to married women for any personality characteristics but instead had a significantly greater preference than women for more external characteristics such as physically attractiveness. However, for certain personality traits there were no significant sex difference and these included those that would equate with high extraversion, high openness and low neuroticism (Buss & Barnes, 1986). Interestingly, those personality traits significantly preferred by married women would indicate men who are more likely to be sexually faithful and to provide resources whereas married men's preferences would specify a partner with high potential fertility and parenting skills who would not demand too many resources as would be predicted by the parental investment model.

When mate preferences of single people were considered, while again as a whole the sample ranked personality traits higher than more external behaviours, there were no sex differences in preferences for personality traits (Buss & Barnes, 1986). This finding was supported by that from a study by Hester & Rudolph (1994). The differences between the two samples in Buss & Barnes' (1986) study may be due to the differences in age and relationship experience or may be a factor of differences in long-term and short-term ideals.

Botwin et al (1997) looked at mate preferences for dating and newlywed couples. Overall there was high agreement between the men and women in the sample as to the 20 most desired personality attributes with them sharing 17 out of the 20 traits. Moreover, agreeableness and intellect-openness were the highest rated personality domains for both men and women in both samples (Botwin et al., 1997). It was also discovered that women were more choosy in their standards for a potential mate which may be due to the much higher costs to a women should she choose the wrong partner.

For both dating and newlywed women surgency (extraversion) and intellect-openness were significantly more desired than for the men (Botwin et al., 1997). However, a consideration of the facets in the surgency domain indicated that the preference was for a more dominant mate and that there was no significant sex difference for sociability of a mate. Thus, women may prefer more dominant men due to the increased need (at least in the ancestral environment) for

protection and also for its association with increased access to resources. However, both men and women desire a sociable mate.

In another study men significantly rated partner warmth-trustworthiness and relationship intimacy-loyalty as more important than women (Fletcher et al., 1999). Whilst these results conflict with Botwin et al's (1997) findings it is not unsurprising when an evolutionary perspective is considered. Due in particular to factors such as concealed ovulation, women are able to cuckold men. However, men may be able to reduce this risk by mating with partners who are trustworthy and loyal. However, Fletcher et al (1999) suggest an alternative explanation that women believe that most men want less commitment and intimacy than they themselves do and so may lower their ideal standards on these traits to enable them to have a more realistic chance of finding a mate.

A consideration of the content of personal ads by Baize & Schroeder (1995), revealed that women tended to stress their personality traits more than men and were found to significantly describe themselves as being higher on surgency and agreeableness than men (Baize & Schroeder, 1995). However, apart from analytic intellect, this tendency did not lead to a significantly greater number of responses. However, for men using terms which were subsumed under the domain of conscientiousness was found to have a significant positive relationship with number of response received (Baize & Schroeder, 1995). This would suggest that women are seeking highly conscientious men, which although has been found in other studies to be relevant in mate preferences does not tend to be the most sought after trait. However, when the terms used to indicate

conscientiousness, such as industriousness, are considered it appears that they may be closely linked with resource acquisition which may explain this finding.

Furthermore, the use of creativity in the adverts was significantly more common in the male ads than the female ads (Baize & Schroeder, 1995). This would lend support to the hypothesis that men tend to publicly display creative ability more than women (Miller, 1999). Moreover, the use of creativity in men's ads was significantly negatively correlated with masculinity and negatively but non-significantly correlated with men's income. The authors conclude that those men with low income, and therefore low resources, compensate by displaying their creative ability. However, this result was non-significant and was not further explored using multiple regression. Therefore, this interpretation appears rather speculative.

Thus it appears that personality traits are highly valued in potential mates by both men and women and that agreeableness is the most desired trait of the Five Factor Model. An understanding of parental investment theory provides a framework within which to understand the preferences for personality traits for men and women as well as the sex differences identified.

### **8.3.2. MATING STRATEGIES AND PREFERENCES**

In general it appears that both men and women became more exacting in their standards for the personality traits the more long term or serious the relationship (Kenrick et al., 1993). Furthermore, the sex differences were found by Kenrick

et al (1993) to be minimal at the level of marriage suggesting that men and women's mate preferences converge when considering a long-term relationship although they may have different reasons for desiring the same traits as discussed above. Moreover, across each of the relationship levels for both sexes the personality trait most desired on average was emotional stability, followed by agreeableness, then extraversion and finally intellect (Kenrick et al., 1993). However, there was an increased desire for conscientiousness for men once the relationship becomes more long-term. This may be due to their greater need to ensure faithfulness in women once they are increasing their level of investment within a relationship.

There was also found to be an interaction between sex and level of involvement. The largest sex difference was found at the level of a one-night stand with women demonstrating significantly higher preferences for all characteristics including attractiveness (Kenrick et al., 1993). This result was supported by a study by Buss & Schmitt (1993). This finding is probably due to the much greater costs for women associated with a short-term mating strategy (Buss & Schmitt, 1993).

Sprecher & Regan (2002) found that for warmth and kindness, expressiveness and openness, and intelligence the greater the commitment the relationship implied the more these characteristics were desired. This was also the case for exciting personality and the rated composite scores for personality variables across romantic relationship types (Sprecher & Regan, 2002). Thus, it appears that intrinsic personality traits are equally desired in a romantic partner

regardless of the length of the involvement. However, it is possible that this result is a product of combining the male and female participants' scores and a separation of the results by gender may reveal greater ratings for traits in a casual sex relationship for women than men as found in Kenrick et al's (1993) study.

Regan (1998) found that for the personality variables interpersonal skill and responsiveness (which consisted of the characteristics of relaxed in social settings, good sense of humour, easygoing, friendly, and attentive to partner's needs) there was a statistically significantly greater desire for this variable in a long-term romantic relationship context than that of a short-term sexual relationship. However, for the traits interpersonal power (which included powerful, dominant, aggressive, and creative and artistic) and intellect (cultured, intelligent, and educated) there was no significant difference between the relationship types (Regan, 1998). This could be interpreted as a greater desire in long-term relationships for factors that would contribute to the maintenance of a relationship but that in both short and long-term matings "good genes", as indicated by powerful, creative and intelligent behaviour, are valuable. However, it is difficult to compare the findings with other studies due to the groupings of the different traits.

To conclude this section, it appears that personality traits are highly valued at all relationship levels. However, the greater the seriousness or commitment within a relationship the more exacting people's standards become on the personality variables, although these results are often theoretical rather than reflecting the relationship strategies participants have necessarily experienced. Furthermore,



the sex differences in desire for personality traits reduces from short-term to long-term relationships with women being much more choosy with respect to these characteristics than men in one-night stands. All these differences can be understood when considering the parental investment model.

### **8.3.3. TRADE OFFS IN MATE PREFERENCES**

Whilst it is easy for people to identify what they would like in a relationship it is unusual for anyone to get everything they desire within one person. Therefore, when people actually choose partners they must make trade offs with the characteristics they desire.

Regan (1998) found that men appear to compromise to a greater extent on personality variables with a casual sex partner than a long-term romantic partner whereas women appear to be less likely to compromise regardless of relationship type (Regan, 1998). This may be due to the lower costs for a man in engaging in a short-term sexual relationship compared to a woman.

Campbell et al (2001) considered how flexible participants were prepared to be in the discrepancies between a romantic partner's scores on warmth/trustworthiness, status/resources and vitality/attractiveness and their ideal partner's scores on the same variables. Both men and women were most flexible on the status/resources dimension although women were significantly less flexible than men (Campbell et al., 2001). The next most flexible variable for both sexes was vitality/attractiveness where there were no sex differences. Finally the two sexes were least flexible on the dimension of

warmth/trustworthiness and again women were significantly less flexible than men on this dimension. Thus, men and women were less flexible on the internal personality variables and more flexible on the external characteristics.

Li et al (2002) noted that while status and attractiveness are often considered to be fundamental in mate preferences they are often not rated highly. They therefore proposed that these attributes are necessities but once a mate has been found to possess a particular level of such traits then other characteristics are taken into account. They therefore divided participants into low, medium and high budget groups and asked them to purchase traits with their allocated budget so that the more of a trait they wanted the more they had to pay for it. For the low budget group it was found that women spent the greatest proportion of their budget on intelligence and yearly income and the least on special nonwork talents and creativity (Li et al., 2002). Men on the other hand spent their largest proportion on physical attractiveness and then intelligence and least on special nonwork talents and yearly income followed by creativity (Li et al., 2002). Thus, women tended to focus on gaining enough resource potential in a mate and men on gaining adequate evidence of potential fertility. As the budget increased women were found to spend significantly less on intelligence, and yearly income and men spent significantly less on physical attractiveness and intelligence thus these traits were considered to be necessities in mate choice. Moreover, those traits that were found to have significantly more spent on them as budgets increased were considered luxuries and these were for women creativity and for men creativity and special nonwork talents. Therefore, as long as a potential mate has enough intelligence as well as physical attractiveness for men and

yearly income for women, then creativity is the characteristic that is then most likely to be invested in. Thus intelligent male artists who earn a reasonable income, and intelligent, attractive female artists should be particularly desirable. Moreover, since the sample Li et al (2002) used were from people at an airport their results may be closer to a general population sample than the commonly used student population samples often recruited in such studies.

Thus, it appears from Li et al's (2002) study that the necessities are those that support the parental investment model of females requiring evidence of resource acquisition and provision and males needing evidence of potential fertility. Creativity appears to be an important luxury for both sexes and this may be due to evidence of intelligence and thereby increased likelihood of survival as well as "good genes".

#### **8.3.3.1. Summary of Trade Offs**

Thus, trade offs in mate preferences appear to comply with the predictions made by the parental investment model with resources for women and physical attractiveness for men being the necessities. Trade offs do however vary across relationship types and women have been found to compromise overall less than men on their standards. Nevertheless, both sexes are less flexible on internal personality traits than external characteristics. However, it should be noted that the studies discussed above rely on hypothetical scenarios rather than real life choices. They also predominantly use student samples that may bias the results.

#### 8.3.4. CROSS-CULTURAL COMPARISONS OF MATE PREFERENCES

One of the most commonly cited cross-cultural studies is by Buss (1989) and Buss et al (1990). The results for the entire sample showed that the most desired characteristics were associated with internal personality dispositions (for example; emotional stability, pleasing disposition, sociability, kind and understanding) and those considered to be least important were “external” attributes such as religious background and good earning capacity. Similar results have been found in others studies (Hatfield & Sprecher, 1995, Toro-Morn & Sprecher, 2003). These results therefore suggest that across cultures people most value personality traits that are likely to contribute to the maintenance of the relationship.

Marlowe (2004) attempted to expand the knowledge on mate preferences to a more traditional hunter-gatherer society, the Hadza, which may demonstrate mate preferences more similar to our *Homo sapien* ancestors. Of particular relevance to this discussion was the finding that overall terms that could be subsumed under the category of character were the most frequently mentioned preferences (Marlowe, 2004). This finding is similar to the results from mate preference studies conducted in modern industrialised societies. Marlowe (2004) suggests that this preference may be to do with a desire for a stable, trustworthy partner. This of course would contribute to the maintenance of the relationship.

Although there are similarities across cultures Buss et al (1990) found that for all rated and ranked characteristics there was an effect of culture, although the magnitude of the effect varied depending on the trait. When the results for the

personality characteristics were considered there were found to be cultural effects for the personality traits pleasing disposition (agreeableness), exciting personality (extraversion), and easy going (low neuroticism) (Buss et al., 1990). However, the reasons for those cultures desiring more or less of these characteristics do not appear to be clear-cut.

### **8.3.5. MATE PREFERENCE SUMMARY**

There is good empirical evidence that internal personality traits are the most valued characteristics in a mate and that these equate to a desire for a mate high in agreeableness, extraversion, openness to experience and conscientiousness, and low in neuroticism. However, these preferences are affected by the sex of the person, the mating strategy, and cultural influences. Moreover, the effects of culture on mate preferences appear to be greater than that of sex (Buss et al., 1990).

## **8.4. CONCLUSION**

Despite the problems with comparing studies using different measures of personality and sexual attitudes and behaviour, different methodologies employed, and different samples it appears that personality traits are important in sexual behaviours, and mate preferences and choices. Moreover, personality characteristics are likely to be relevant to these behaviours because of their ability to influence mating and reproductive success. This will, in part, be tested in the following study which considers the reproductive behaviours, personalities and artistic status of artists.

## **CHAPTER 9**

# **THE REPRODUCTIVE SUCCESS AND PERSONALITIES OF VISUAL ARTISTS**

### **9.1. INTRODUCTION**

This final study has evolved from the Definitions of Creativity survey and the Fitness Indicator project. In the first study participants were found to attribute more positive personality traits to highly creative individuals despite empirical evidence which in part contradicts this assumption (Feist 1998). Furthermore, the second study identified that personality traits were considered important indicators by observers of the artworks for deciding whether to go out on a date with an artist and that these characteristics were to some extent determinable through a consideration of the artworks. Therefore, if professional artists are believed to have more attractive personalities and such attributes are considered to be relevant in mate selection then this would suggest that the sexual selection hypothesis might be relevant to visual art. Thus, the next study will consider whether the success and/ or professionalism of artists does actually improve their reproductive success and if personality factors influence this relationship.

Reproductive success should be measured by number of biological children produced who survive to reproductive age. However, with the widespread availability of contraception, at least in the West, this has meant that while number of biological children is a measure of achieved fertility (with medical advances survival of children to reproductive age is considerably less of an issue in the West) it may not reflect the potential fertility of an individual had

contraception not been available (Hopcroft 2004). When the aim is to understand the evolutionary emergence of a behaviour and sexual selection is believed to be the mechanism by which it arose, then potential fertility is an important indicator of whether those engaging in the production of art to a high standard are likely to have been more successful in evolutionary terms. Furthermore, the ability to gain an increased number of sexual partners, in other words one's mating success, may also act as an indicator of reproductive success, at least for males, since the more females a male can fertilise the greater his reproductive success (Perusse 1993).

Therefore, this study will consider the mating success and potential and achieved fertility, of both male and female visual artists and the relationship between these, the success of the artists, and the personalities of both the artists and their partners.

## **9.2. HYPOTHESES**

As yet there is very little work that has been conducted on mating success or potential fertility and artists (see (Haselton and Miller in press) and (Nettle and Clegg in press-b) for work that has been done). However, from a review of the literature on personality and sexual behaviour (Chapter 8) the following hypotheses can be proposed.

If art acts as a fitness indicator then the better the quality of the artwork the better the quality of the genotype and phenotype of the artist and therefore the greater number of sexual partners that should be available to the "best quality" artists (Miller 2001). These artists should also have increased offspring numbers

(Miller 2001). However, Nettle & Clegg (in press-b) found that, in a study using artists and poets, while the more professional creative producers had significantly greater numbers of sexual partners than non-producers and hobbyists, there was no effect of creativity on numbers of children (achieved fertility). Thus, the first hypothesis, is expected to reflect the results of Nettle & Clegg (in press-b), in that

- 1. Those artists who consider themselves as professional or serious artists will gain significantly more matings and have greater potential fertility than those who consider themselves to be hobby artists. However, achieved fertility will not be correlated with self-perceived status.**

Nevertheless, Nettle & Clegg's (in press-b) measure of artistic status is a self-perceived subjective measure which may suggest that these artists subscribe at least to some extent to the identity of an artist as defined by society and this is likely to therefore mirror the stereotype to a degree. If the artist behaves in a manner that allows him/her to fit into the stereotype of an artist that, certainly in the West, is generally considered attractive then they may gain more mates and increase their actual and potential fertility. To go beyond this and identify whether artistic status as defined by a more independent criteria influences artistic status a more objective measure of artistic status is required. Whilst this may appear to be a difficult concept to measure, society does identify some artists as better than others and this may be represented by factors such as those artists deemed as more successful having more exhibitions or longer exhibitions



of their work, selling more pieces of art and/or at higher prices, and producing a greater amount of their income from their artwork alone. Furthermore, other factors, not necessarily determined by society may also indicate objective artistic status such as the time spent on art and particular attitudes of the artists towards their art. Thus, a measure of objective artistic status can be defined within this study. Therefore the second hypothesis is that

- 2. Those artists with higher objective artistic status will gain significantly more sexual partners and have greater potential fertility than those who have lower objective status. However achieved fertility will not be correlated with objective artistic status.**

However, increased income has been found to be correlated with actual reproductive success (Hopcroft 2004) and status (which included a measure of income) was found to positively correlate with potential fertility (Perusse 1993). Therefore it will be necessary to factor out income to see whether artistic status has a relationship with mating success and potential fertility above and beyond income. Furthermore, age also needs to be controlled for since the longer one has lived the more potential for a greater number of sexual partners. Hence income and age will be controlled for when considering hypotheses 1 and 2.

A further prediction by Miller (2001) is that those with high mate values should be more likely to have increased numbers of extra-pair copulations (affairs) because of their increased attractiveness. Therefore, it is hypothesised that

**3. Professional artists will have a significantly greater number of extra-pair copulations compared to less professional artists.**

Miller also claims that there are a number of sex differences between male and female artists, which may affect their reproductive success. Thus, male artists should be more likely to produce artworks for public display since females are usually choosier and males often display more intensely than females (Miller 1999). The final hypothesis is therefore that

**4. Male artist should have a significantly greater number of exhibitions and/or the length of the exhibitions will be longer than for female artists.**

In fact, sexual selection predicts a number of sex differences in reproductive strategy. Since the costs to women are greater for short-term relationships than for men (Buss and Schmitt 1993) then it would be predicted that female artist at all levels will have fewer short-term relationships than male artists. Furthermore, since men have been found to prefer a greater number of sexual partners than women (McBurney et al 2005) then this would suggest that female artist would have fewer sexual partners than male artists. However, Nettle & Clegg (in press-b) found that serious and professional artists and poets had significantly higher numbers of sexual partners than hobbyists or non-producers and that there was no effect of sex on this interaction. Thus, it is possible that professionally creative females are a special population in terms of their sexual behaviour.

Therefore, sex differences in terms of artistic status and reproductive success will also be considered but no predictions made.

In terms of personality, artists have been found to be high in openness and neuroticism (Gotz and Gotz 1973; McCrae and Costa 1997; Nowakowska et al 2004; Walker et al 1995) which could suggest that they are less likely to be reproductively successful as openness has been found to be an indicator of an inclination towards homosexuality and bisexuality (Schmitt and Buss 2000) and neuroticism has been associated with either a decline in sexual behaviours or there has been found to be no relationship between the two (Miller et al 2004; Schmitt 2004; Wright and Reise 1997). However, artists are also found to be lower in conscientiousness (Feist 1998; Walker et al 1995) which would suggest that they would engage in more risky sexual behaviour such as increased promiscuity (Buss and Shackelford 1997; Schmitt 2004) although the results are mixed. Moreover, since artists have also been found to be high in both extraversion and introversion (Dollinger and Clancy 1993; Feist 1998; Furnham 1999; Furnham and Chamorro-Premuzic 2004; McCrae 1987; Nowakowska et al 2004) it is not possible to predict their patterns of sexual behaviour by considering the personality trait of extraversion. Thus, it can be seen that the mixture of personality traits found to be present in artists do not suggest one typical pattern of sexual behaviour. Therefore the data from personalities of the artists and their partners will also be considered in light of their reproductive success but no hypotheses can be generated from the current literature.

### 9.3. THE QUESTIONNAIRE

Data was collected in the form of a questionnaire (Appendix 20) that consisted of three sections. The researcher worked closely with two artists in the construction of the questionnaire, especially the first section looking at the artistic behaviours and beliefs of the participants. This first section attempted to consider variables that may indicate the success and level of professional status of the artists. Initially the artists were asked their own opinion as to their professional status. However, it is probable that different individuals will define the terms professional, serious and hobby artist differently depending on such factors as who they compare themselves with, their criteria for professional status, and their self-confidence as an artist. Therefore, other questions relating to professional level were included. However, it should be noted that each one of the questions in section A separately could not be said to indicate artistic status. For example, arts training or number of exhibitions do not, on their own, necessarily indicate that someone is a professional artist. In fact, Bain (2005) states that while artists may gain formal art qualifications and/or membership of professional art organisations these do not determine artistic status or success and are not prerequisites for distinguishing professional from amateur artists. Nevertheless, they are all possible indicators of status within the art world and therefore part of the analysis will consider which aspects best define artistic status.

Furthermore, certain questions in section A are more indicative of success as viewed by society. Such questions include those related to the income derived from the art, and the duration and quantity of exhibitions. Others are more suggestive of the professionalism of the artist and their identity as an artist such

as those asking about attitudes and beliefs and time spent on artwork. In fact, interviews of Canadian fine artists found that part of their definition for being considered a professional artist was demonstration of long-term commitment to their art, dedication and that they attempted to make a living from it (Bain 2005). Thus, in the questionnaire in this study time spent on art and what they consider their main occupation to be may also capture some of the aspects that indicate professionalism.

Since the term “artist” is widely used not only by those traditionally considered to be artists such as painters and sculptors but also by, for example, graphic designers and web designers, the artists were asked to describe their artwork. Thus, if there were enough artists in different categories it would be interesting to consider the results in terms of these different types. In fact, there is evidence of differences between different types of artists, which could affect reproductive success. Stohs (1990) found that male fine artists had lower status in terms of their careers and considerably lower incomes than did male applied artists although fine artists did make significantly more money from their art sales (Stohs 1990). Thus, from Stohs’ results fine artists would be unlikely to attract mates through resources or status and therefore may be less reproductively successful than applied artists.

Moreover, since there is evidence that different styles of artwork are preferred by different personalities (Furnham and Avison 1997b; Furnham and Walker 2001a, 2001b; Knapp and Wulff 1963; Rawlings 2003) then it may be possible to consider whether artists differ in personality domains depending on the style of

art they produce. Furthermore, it could also be examined whether there are any patterns between the personality domains of the artists' partners and the style of art produced by the artists.

Section B asks the artists to rate their own and their partners personalities using 50 questions from Goldberg's Five-Factor Model of personality traits (International Personality Item Pool 2001), which parallels Costa & McCrae's NEO-PI-R. It was decided to use the shorter 50 question version to reduce fatigue when completing the questionnaire since the participants are requested to complete it twice. However, the coefficient alphas and correlations with the NEO-PI-R suggest that despite the smaller number of items for each domain, the 50 question version continues to demonstrate that it equates closely to the NEO-PI-R and has good internal consistency and satisfactory reliability (Buchanan and Smith 1999).

When asking participants in research to rate themselves (self-ratings) and their partners (partner-ratings) on personality domains it raises issues of validity. Nevertheless, correlations between self and spouse ratings tend to demonstrate moderate to large positive, significant correlations, suggesting that there is agreement on personality variables between independent raters (McCrae 1982; McCrae et al 1998; Muten 1991). Furthermore, spouses' ratings of their partners' personalities have been demonstrated to be stable over time (Costa and McCrae 1988). However, McCrae (1982) noted that there was considerable variation within and between the sexes in the size of the correlations and he attributed this variance in part to the visibility of the traits and also to sex

differences in perception of the traits so that agreement is greater on extraversion and openness when men are rated and better on neuroticism when women are rated. There are also of course differences between individuals as to their ability to assess personality traits regardless of their sex. There may also be biases in self-ratings. One particular problem is that of social desirability (Feingold 1992; Watson et al 2000a). However, McCrae et al (1998) found no significant evidence for impression management in either self or spouse ratings.

There are also difficulties with rating one's partner's personality. For example, the time that one has known one's partner may affect the accuracy of the responses since it has been shown that there is an effect of acquaintanceship on the validity of ratings (Funder and Colvin 1988) so that the less time a couple have known each other the more likely they are to estimate the personality characteristics of their partner by assuming similarity with their own personality traits particularly with lower visibility traits such as neuroticism (Watson et al 2000a, 2000b). Nevertheless, there is evidence that assumed similarity is lower for the Big Five Inventory (Watson et al 2004). Therefore, assumed similarity might also be lower for the Five Factor Model used in this study.

Another possible bias in partner ratings was found by Watson et al (2000a). Participants in their study who were less well acquainted with their spouses tended to use their levels of relationship satisfaction to aid in their judgements of their spouse's personality. Furthermore, idealisation of the partner may occur when satisfaction is high thus personality ratings of the partners by highly satisfied spouses may be better indicators of a person's idealised spouse rather

than actual spouse. It is also possible that there are halo effects when rating the personality of one's partner (Feingold 1992). Thus, a particularly positive characteristic that a partner is believed to possess may influence ratings on other traits in a positive direction regardless of the reality thus creating a bias within the assessment.

However, a study by McCrae et al (1998) found that discrepancies between self and spouse ratings on personality variables were not significantly associated with conscious presentation of oneself or one's spouse, length of marital relationship, quality of marriage, or assumed similarity. In fact, the factors that appear to be most influential in disagreements between ratings were those associated with the measuring instrument and use of different types of behaviour. For example, reasons for the disagreement in ratings included difference in the interpretation of words or items, different behaviours having been considered, and spouse being unaware of covert feelings and attitudes (McCrae et al 1998). These factors are in fact more easily rectified than the ones usually considered in the literature, such as length of acquaintance. Thus, personality measures can be expressed in clear, simple writing and participants can be provided with guidance as to whom they should compare themselves or their spouses with. The questionnaire used in this study does attempt to do this since it indicates that the participant must use comparisons with those of the same sex and age as themselves. It also stresses honesty and anonymity and confidentiality. Moreover, those who were involved in the pilot study did not highlight that there were any difficulties with interpretation or understanding of the personality items that suggests that the measure is relatively easy to use.



Thus, the results for spouse and self-reports suggest that whilst there is often good agreement between the two there are also some discrepancies. By considering the wording of the measurement of the personality scale used within this study it is hoped that the differences will be reduced. However, it was also necessary to only use self-ratings for the artists' personalities and partner-ratings for the partners of the artists because to have gained self and partner ratings for each artist and his or her partner would have meant that both people would have had to agree to participate which is likely to have reduced the numbers of participants considerably. It is important for this study to have a large number of participants to ensure good statistical power for the findings. Furthermore, if the partners had also been involved the artists may not have been able to be as honest with some of the questions, especially those regarding sexual behaviour. This would have led to inaccurate conclusions being drawn regarding the reproductive success of artists. Therefore, considering the above discussion it was felt most appropriate to keep the data to self-reports of artists' personalities and partner-ratings of their partners' personalities.

Section C consists of demographic and sexual behaviour questions (Appendix 20). Two of the demographic questions are about occupation and numbers of jobs. These may also be indicators of professionalism and success and so should be considered along with questions in section A.

Questions 25 to 40 are looking at sexual behaviour in an attempt to measure mating success and potential and achieved fertility. Question 25 asks about

sexual orientation. Since the sexual selection hypothesis is concerned with heterosexual relationships then the data analysis will focus on these.

The next few questions consider the artist's current relationship. The data from these questions can be considered in light of the personality data. For example, the relationship between length of relationship and personality can be explored. Also, the association between the personality of the artist and his/ her partner and the number of children can be considered.

There then follows questions on numbers of biological children. Actual numbers of biological children acts as a measure of achieved fertility (Hopcroft 2004; Perusse 1993) and should discount stepchildren, which could distort the results. However, it should be noted that men tend to, if anything, undercount their offspring and so it is possible that the findings may underestimate male artists' achieved fertility (Hopcroft 2004). Furthermore, men may not be aware of all their offspring if they have had a number of short-term relationships thus again causing underestimation of men's achieved fertility.

Numbers of sexual partners (Q35) is an indicator of the ability of a person to attract mates and is a commonly used measure of mating success (Faurie et al 2004; Nettle and Clegg in press-b). The following question on length of relationships (Q36) indicates the mating strategy (predominately short-term, mainly long-term or mixed). Both of these questions were free response so that participants typed in a number rather than selecting from a box. Whilst this may encourage some inappropriate responses, it was felt that it would reduce pressure

to socially conform since, for example, those with limited sexual experience may feel inadequate and increase their number of experiences if the drop down box provided the possibility of 100 sexual partners.

Question 37 then looks at potential fertility by asking about frequency of sexual intercourse over the last 12 months. Hopcroft (2004) also used this measure in her study. She argues that although it is the timing of sex that increases the likelihood of conception the greater the number of matings the greater the likelihood that these will coordinate with ovulation and therefore the greater the possibility of conception and so frequency of sex is an appropriate measure of potential fertility (Hopcroft 2004). Nevertheless, Perusse (1993) argues that the number of potential conceptions (NPC) for men can only be measured by calculating the number of partners and the number of coital acts per partner. However, this would have extended the length of time taken to complete the questionnaire considerably for at least some individuals and it is unlikely that the numbers provided for numbers of coital acts would have been accurate particularly for long-term relationships or those that occurred several years ago. It was therefore decided to use frequency of sex rather than NPC as a measure of potential fertility.

The final three questions consider extra-pair copulations since Miller (2001) predicts that more professional artists should have a greater number of these due to their increased attractiveness. However, personality may be a mediating factor in this relationship since certain personality characteristics such as low agreeableness and conscientiousness have been found to demonstrate a

relationship with increased likelihood of extra-pair copulations. This can therefore be explored.

Once the first draft of the questionnaire was completed ethics approval was gained and a pilot study conducted using 6 artists. All those in the pilot study were female, as it appears that the males were not interested in participating. This is a common problem with gaining male participants for studies. Due to time constraints it was decided not to further pursue feedback from male artists for the pilot study. However, while this could be a potential problem, there was no feedback from those male artists who completed the questionnaire that would suggest that they were having problems with its completion. The feedback from the participants of the pilot study suggested only minimal changes to the wording of the questionnaire.

The questionnaire (Appendix 20) was then placed online on the ELSA web server at <http://elsa.open.ac.uk/artist.survey>. It was decided to collect data online and in the form of a self-completion questionnaire due in part to the large number of responses required to ensure statistical validity of the results. Thus, an online questionnaire enables larger volumes of data to be collected relatively cheaply and to access special populations, such as for this study, more easily than has previously been the case (Buchanan and Smith 1999; Mathy et al 2003). Moreover, individuals have been found to be lower on social desirability and social anxiety when completing internet based questionnaires, especially when they are anonymous (Joinson 1999) thus suggesting that participants may provide more honest response using this medium, which is particularly relevant to this

research due to the personal nature of the questions. Furthermore, the participants would not be influenced in their responses by meeting the researcher although it was necessary for the researcher to be named and therefore her sex to be apparent due to the ethical requirement to enable participants to contact the researcher. A more detailed discussion on the use of online questionnaires can be found in Chapter 4.

Whilst a discussion on the type of individuals likely to participate in online studies is also discussed in Chapter 4, it is also important to consider the research that has been conducted on volunteers to sexuality research. However, whether there is a difference in personality between volunteers for a sexuality study and volunteers for a study not apparently related to sexuality is unclear. Bogaert (1996) found that those who volunteered for a study specifically on sexuality were significantly higher in sensation seeking than those volunteering for a study on personality and film. This is an unsurprising result since sensation seekers are likely to be attracted to a study that suggests something more unusual and arousing. However, Saunders et al (1985) did not find any significant effect of recruitment technique (erotic versus personality study) on the personalities of the participants when using Jackson's Personality Research Form.

However, there do appear to be more consistent results for the difference between volunteers and non-volunteers for sexuality research on previous sexual behaviours. For this type of research volunteers have been found to have more sexual experience (Bogaert 1996; Morokoff 1986; Saunders et al 1985), be more erotophilic (Bogaert 1996), less sexually inhibited (Morokoff 1986), and to have

greater masturbatory experience (Morokoff 1986; Trivedi and Sabini 1998). However, there are problems with some of this research. For example, the participants in Morokoff's (1986) study were all recruited for a study on sexuality however the difference between the volunteers and non-volunteers were that the volunteers agreed to have an invasive technique carried out to assess their level of sexual arousal. Thus, the differences between the volunteers and non-volunteers cannot be assumed to apply to those who would not agree to participate in a study on sexuality at all. Nevertheless, there is the possibility that individuals volunteering to participate in research, which involves responses to sexually intrusive questions, such as this current study, may not be representative of the population to be studied as a whole in terms of their sexual behaviours. Moreover, a consideration of sexual behaviours and personality traits suggests that volunteers may be higher in extraversion and openness to experience. Therefore, not only the sexual behaviours but also the personality traits of the artists who volunteer for the present study may not be representative of the population of artists as a whole. However, the initial advert (Appendix 21) did not mention sexual behaviour as being part of the study rather it said that the study considered the lifestyles and personalities of artists. Therefore, this may at least attract a more diverse sample of artists to go onto the website. From the front sheet of the website (Appendix 20) they were then informed that some of the questions were of a sexual nature. This may then produce a more biased sample although possibly not to the extent that it would have if the initial adverts had highlighted the sexual nature of the study. Furthermore, the fact that the study is online and anonymity and confidentiality are assured may encourage

those who are less likely to participate in such research to complete the questionnaire.

A final problem with using an online questionnaire is that it is possible that other people may be present when the individual is participating, which may influence responses. This may cause the participant to inflate or reduce the responses to the sexual behaviour questions. Also, when completing the personality inventory for their partner their responses may be influenced by the presence of their partner or their particular feelings about their partner on that day. Nevertheless, the fact that the questionnaire is online means that they can quickly shut down the questionnaire with no evidence that they were completing it should someone come into the room that they do not want informed of their answers.

Thus a consideration of the above issues led to the conclusion that an online questionnaire would be the most appropriate method for this study.

#### **9.4. SAMPLE**

The sample was primarily recruited from a quarter page advert (Appendix 21) in two artists' magazines: a-n magazine and Artists and Illustrators magazine. The former magazine predominately caters for professional artists and the latter tends to attract more amateur/ hobby artists. Professional, serious and hobby artists were required since this should provide a range of creative abilities to test the hypothesis that the more creative the artwork the greater the artists' mating success and potential fertility should be.

Furthermore, information about the study was also posted on the following websites; Axis, the Mini Gallery, [Welshpaintings.co.uk](http://Welshpaintings.co.uk), and the Society for All Artists. Amateur arts societies and groups that advertised on the Internet were also contacted by email and post in an attempt to attract more amateur/ hobby artists. There is a potential problem with this since those groups with websites may constitute a different population than those that do not have a website, especially those who display their artwork on the web as they may be more prone to displaying their artworks in general than other amateur artists groups. However, in theory there should still be a difference in the quality of the artwork compared to serious and professional artists and so the latter groups should still attract more sexual partners. Furthermore, amateur/ hobby artists were also recruited by advertising on the Intranet at a University in the South of England to attract any such artists within this population and a notice was also posted on Psychology Research Online (<http://www.psychresearch.org.uk>) .



## **CHAPTER 10**

### **DATA ANALYSIS OF THE REPRODUCTIVE SUCCESS AND PERSONALITIES OF VISUAL ARTISTS QUESTIONNAIRE**

#### **10.1. DEMOGRAPHICS**

Two Hundred and fifty three artists participated in the study. Of these 93 (37%) were men and 160 (63%) were women. Overall 92.5% of the participants were heterosexual. A breakdown of sexuality by sex revealed that 91% of the male artists and 94% of the female artists were heterosexual. Since this study considers reproductive success then only the data from the heterosexuals will be used in the following analysis. Thus, the final sample consisted of 85 (36%) men and 151 (64%) women. The age range was from 18 to 78 years, with a mean of 42.67 years and standard deviation (SD) of 13.22, and approximated a normal distribution.

The predominant ethnic origin was white British (80%) with other white background being the second biggest category with 11% of the participants. The remainder of the participants were relatively evenly spread across the other categories (Appendix 20). This limits the generalisability of the results to white, mainly British, artists.

## 10.2. DESCRIPTION OF ART

From Table 54 it can be seen that just under half of the artists were painters (using oils, watercolours, acrylics, pastels, ink, pen, pencil). The second largest number used at least two media within which to produce their art (under mixed there was included two or more of any of the other categories as well as installation work which involves a variety of media). Thus, the term artist, although predominantly used in its traditional form in this study, is also used much more widely. In fact, as well as photography and video (under digital in table 54), two writers (under "other") also considered themselves artists.

**Table 54. Distribution of medium/media used by artist.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	painting	107	45.3	46.9	46.9
	sculpture	24	10.2	10.5	57.5
	digital	16	6.8	7.0	64.5
	textiles	7	3.0	3.1	67.5
	mixed	72	30.5	31.6	99.1
	other	2	.8	.9	100.0
	Total	228	96.6	100.0	
	No response	8	3.4		
Total		236	100.0		

**Table 55. Distribution of styles employed by the artists**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no style	1	.4	.5	.5
	representational	67	28.4	32.2	32.7
	abstract	46	19.5	22.1	54.8
	conceptual	9	3.8	4.3	59.1
	functional	2	.8	1.0	60.1
	mixed	75	31.8	36.1	96.2
	other	8	3.4	3.8	100.0
	Total	208	88.1	100.0	
	No response	28	11.9		
Total		236	100.0		

Furthermore, the majority of artists described their style as mixed, representational or abstract (Table 55). Those who put figurative were included in the representational category since according to the Artlex art dictionary (<http://www.artlex.com/>) figurative art portrays a representative image and is the opposite of abstract art in some ways. The other category included gothic, kitsch, surreal, cartoon and primitive. It should be noted that each one of these art styles does not necessarily preclude the others. Thus, conceptual art could be abstract or representational.

A consideration of the distribution of styles used between the two sexes did not suggest any significant differences (a  $\chi^2$  test was not possible due to 6 of the cells having an expected count of less than 5). However, the frequencies of the media used by the two sexes showed some differences although again statistical confirmation of this using  $\chi^2$  was not possible. Thus, 16% of men compared to 8% of women used sculpture and 10% of men compared to 6% of women used digital technology. Furthermore, only the female participants used textiles. However, 47% of both sexes used paints and similar percentages of males (34%) and females (28%) used mixed media.

### **10.3. SELF-PERCEIVED ARTISTIC STATUS**

Of the male participants 50 (59%) indicated that they were professional artists, 22 (26%) stated that they were serious artists and 12(14%) that they were hobby artist. One man did not complete this question. Of the females, 58 (38%) said that they were professional artists, 46 (31%) stated that they were serious artists and 47 (31%) that they were hobby artists.

Whilst an individual's interpretation of their artistic status is valid there are some problems with this definition. In particular several comments suggested that professionalism equated with either significant financial gain from painting or having several years experience. For example, one individual wrote "I would like to be considered "professional" but in the strict sense of the word I am not as I cannot make a financial living from it at the moment..." and another stated that "...I don't feel I can call myself a "professional" just yet! I need more experience and contacts to call myself that". However, others who made little money or were at the beginning of their careers considered themselves to be professional. Furthermore, hobby artist was used by some who attended art classes once a week and had no further ambitions whereas others used it because they were changing career with the hope of becoming serious or professional artists. Interestingly, one participants stated "I was torn between serious and hobby. I take my art seriously, but do not earn my living from it. Hobby is a rather harsh, somewhat derogatory term – to me at least. In reality I think of myself as a part time artist with a full time job in a completely different sphere".

Moreover, the low number of male hobby artists causes problems with statistical analysis due to lowering of statistical power. Therefore, while the self-perceived artistic status will be taken into account, other factors which may indicate artistic status will also be considered.

#### **10.4. FACTOR ANALYSIS OF ARTISTIC STATUS VARIABLES**

To try and identify how the variables in section A are associated and also to identify a more objective measure of artistic status, a principal components

analysis (PCA) was conducted using varimax rotation. A five factor solution accounted for 73% of the variance (Table 56).

Table 56. Rotated Component Matrix for artistic status variables(a)

	Component				
	1	2	3	4	5
timespent	.831				
imp. of art	.729	.392			
% of income from art	.711		.309		
public.display	.438	-.308			.382
public recog.		.839			
recog from other artists		.830			
max. cost of art			.864		
min. cost of art			.785		
years as artist				.961	
risks					.931

Factor 1 consists of the variables time spent on art, importance of art in life, percentage of income from art, and public display. These are all variables that are likely to be most closely associated with artistic status and so this factor could be labelled as artistic status. The second factor is primarily made up of importance of public recognition and importance of recognition from other artists and can thus be labelled need for recognition. Interestingly, amount of public display (this variable is a composite of number and length of exhibitions, see below) is negatively loaded onto this factor which suggests that the desire for recognition reduces with increasing public display. Perhaps when artists are exhibiting to a large extent they are gaining so much recognition that they no longer desire it as they did when they displayed less. The third component is associated with costs of art and will thereby be labelled as such. The fourth

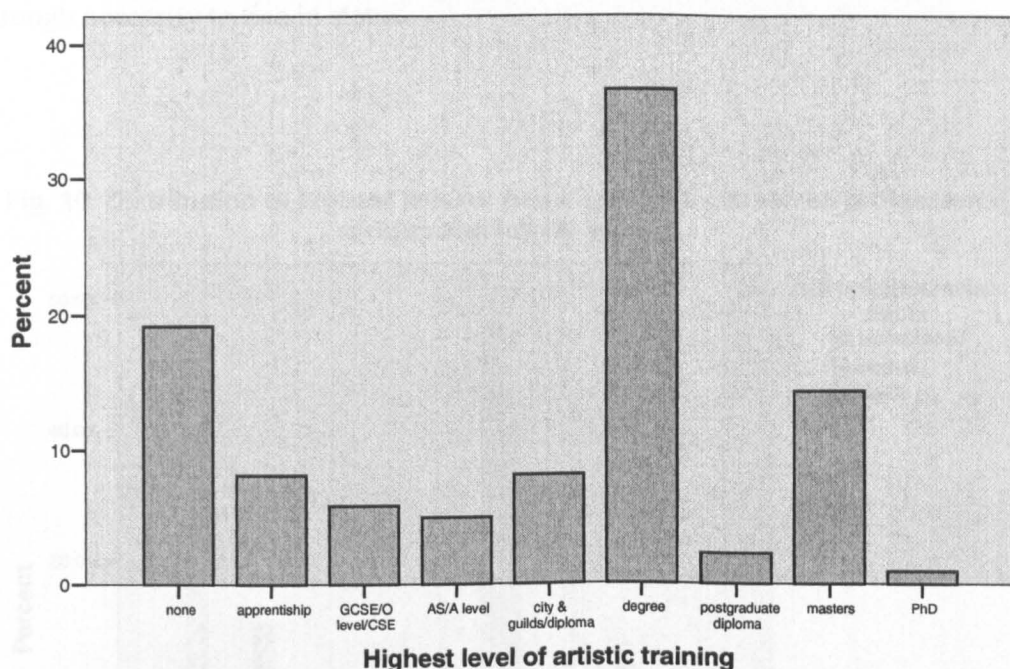
factor is about number of years as an artist and the final, fifth, factor is about the importance of risk taking in art (Table 56).

Although, it appears that factor 1 would be the most appropriate objective measure of artistic status it reduced the number of participants to 148. Therefore, as time spent on art was the variable which loaded most strongly on the first factor, it was decided to use this variable instead as this did not reduce the number of participants so drastically (214) and thus the results of the analyses should be more robust. Time spent was divided into three equal categories from the distribution, to represent professional, serious and hobby artists, and this was done using SPSS. Thus, the categories were low time spent 0 to 10 hours (hobby artists), medium time spent 11 to 25 hours (serious artists) and high time spent over 25 hours (professional artists).

### **10.5. FORMAL ARTISTIC TRAINING**

From fig. 9 it can be observed that there was a wide range of artistic training among the artists from no formal qualifications to PhD. The most commonly achieved qualification was a degree, with several artists possessing more than one degree in various artistic subjects.

**Fig 9. Distribution of highest level of formal artistic training among all participants**



From figures 10 and 11 it appears that there is a difference in level of artistic qualification in the hobby group compared to the other two groups since the hobby group had a much greater number within the none and apprenticeship training and fewer hobby artists are found in the other categories. The difference between the two measures of artistic status appears minimal when the graphs are compared. Bain (2005) suggests that artists gain artistic qualifications to improve their claim to be professional artists, rather than qualifications being a requirement to achieve professional status, since artists often feel that art is not considered a “proper” profession and so academic qualification will provide it with some kudos to those outside of the artworld. However, it is not possible to know if this applies to the artists in this study although for both the self-perceived and objectively assessed professional groups over 10% had no formal arts qualifications but are still able to consider themselves professional artists

which suggests that qualifications are not absolutely necessary for higher artistic status and so some artists may gain formal arts training for other reasons than through necessity to rise in status.

**Fig. 10 Distribution of highest level of training for self-perceived professional, serious and hobby artists**

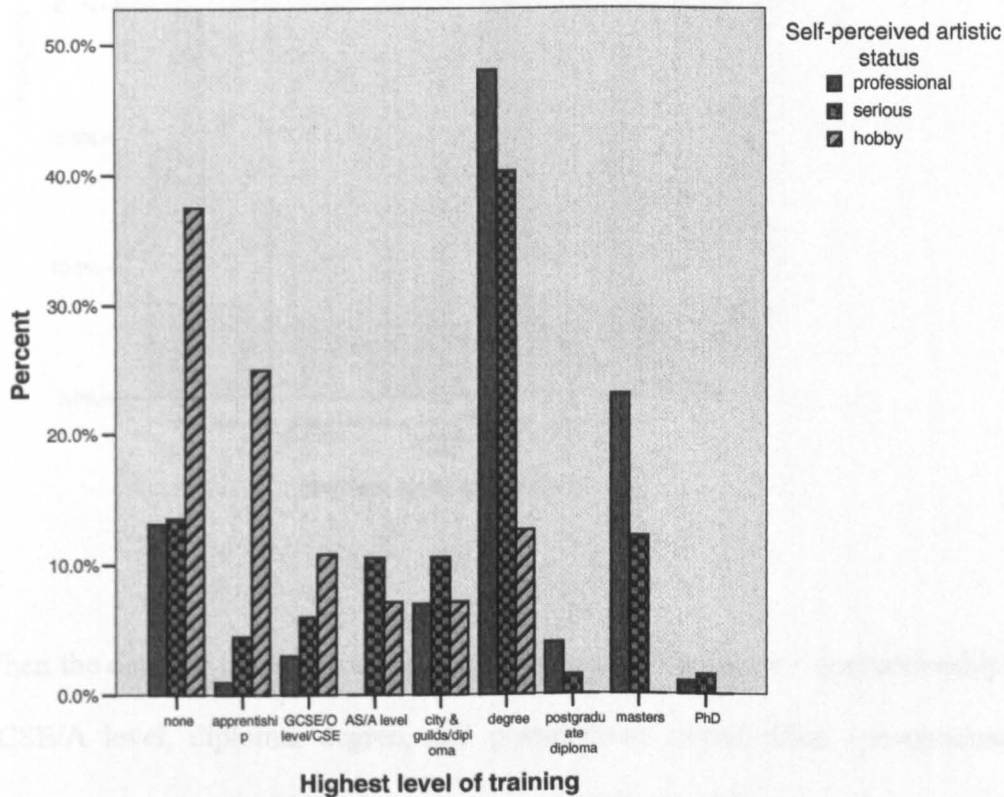
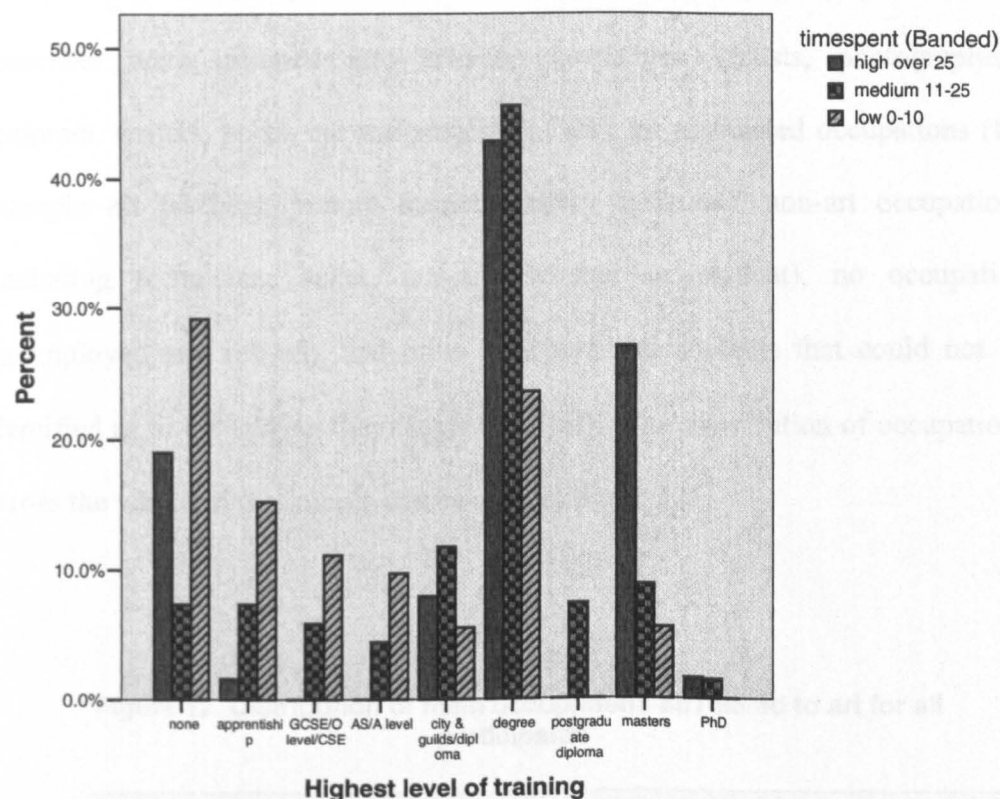




Fig. 11 Distribution of highest level of training by artistic status (timespent)

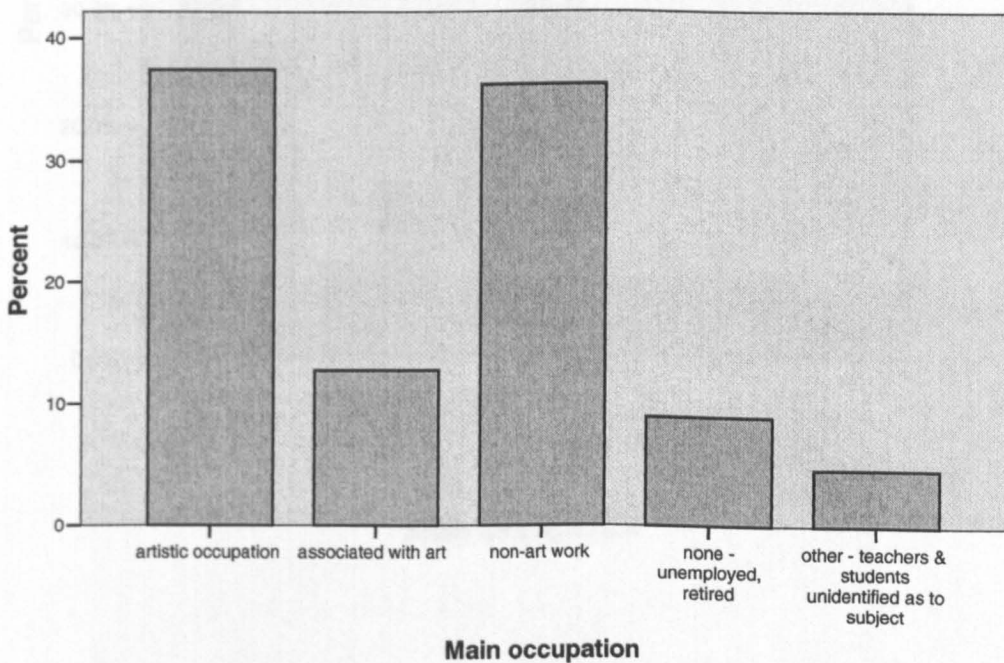


When the data for training was divided into no training (none + apprenticeship), GCSE/A level, diploma, degree, and postgraduate qualification (postgraduate diploma + masters + PhD) there were no significant differences between the qualifications of male and female artists ( $\chi^2 = 3.767$ ,  $df = 4$ ,  $p = 0.438$ ). Thus, any sex differences in artistic status do not appear to be due to different levels of training for the male and female participants.

## 10.6. MAIN OCCUPATION

For question 21 participants were asked to state their main occupation. The responses were grouped into artistic occupations (artists, photographers, sculptors, writers, poets, etc and students of art), art associated occupations (for example art teachers, picture framer, gallery assistant), non-art occupations (including technician, baker, non-arts teacher or student), no occupation (unemployed and retired), and other (teachers and students that could not be identified as to the subject they taught/ studied). The distribution of occupations across the whole of the sample can be seen in figure 12.

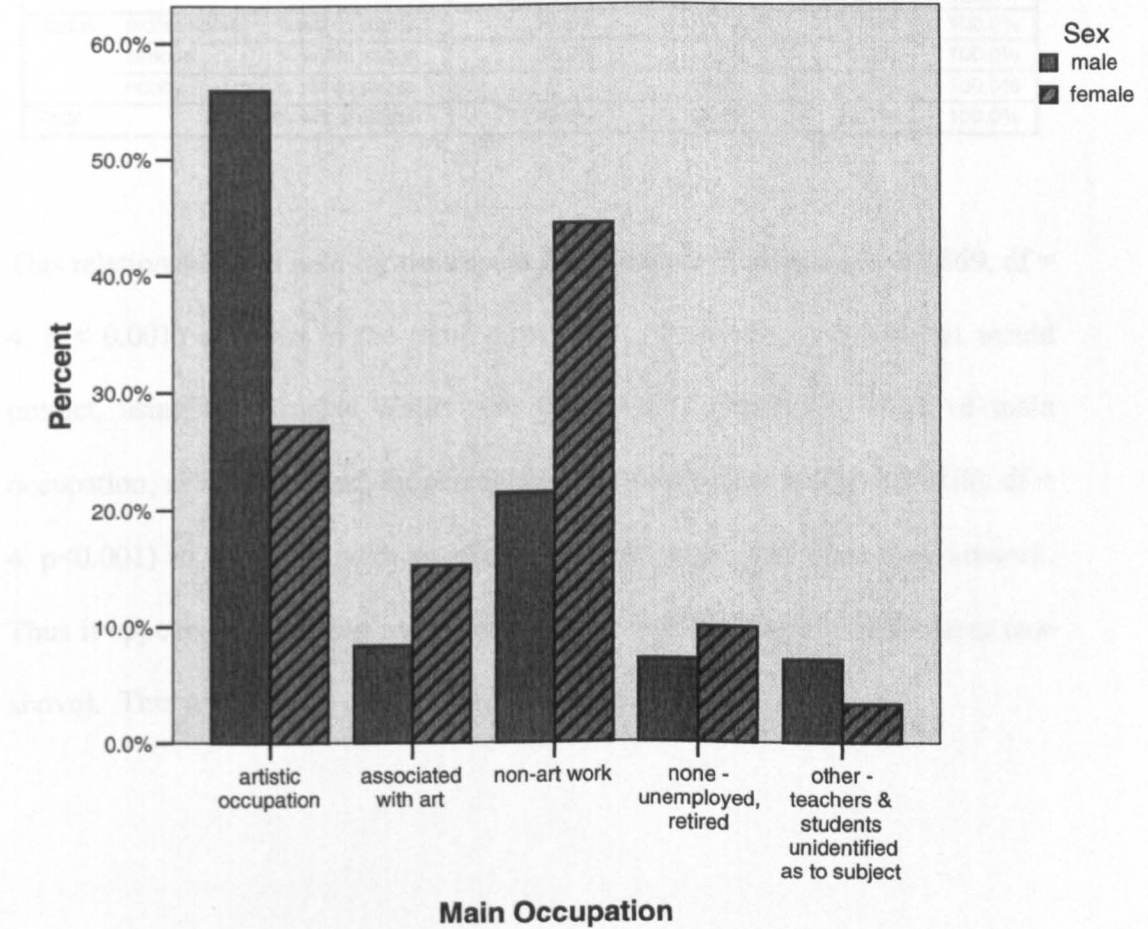
**Figure 12. Distribution of main occupations as related to art for all participants**



Furthermore, there was a significant sex differences within the occupations ( $\chi^2 = 22.475$ ,  $df = 3$ ,  $p < 0.001$ ) (note; to perform the chi squared test the “other” category was removed since otherwise there was found to be 1 cell with an

expected count less than 5. It was felt appropriate to remove this category since the occupations within this category were unknown as to their relationship with art). Thus the male artists appear to be employed in more arts related occupations than the female artists (Fig. 13).

**Fig.13. Distribution of main occupations for male and female artists**



Due to problems with a number of cells having expected counts of less than 5, a chi squared test was conducted for self-perceived status and main occupation using only three of the occupational categories; artistic, art associated, and non-art occupations (again this was felt to be appropriate since it allowed a focus on

occupation as related to art only). There was a significant relationship between self-perceived artistic status and main occupation ( $\chi^2 = 92.754$ ,  $df = 4$ ,  $p < 0.001$ ) and the general pattern was for a shift from an artistic to non-arts related occupation as the participants rated themselves from professional to hobby artists, as would be expected (Table 57).

**Table 57. Self-perceived artistic status \* main occupation Crosstabulation**

			Main occupation			Total
			artistic	associated art work	non-art work	
Status	professional	% within status	74.7%	14.1%	11.1%	100.0%
	serious	% within status	23.2%	14.3%	62.5%	100.0%
	hobby	% within status	2.1%	14.9%	83.0%	100.0%
Total		% within status	43.6%	14.4%	42.1%	100.0%

This relationship also held for time spent as a measure of status ( $\chi^2 = 83.869$ ,  $df = 4$ ,  $p < 0.001$ ) and was in the same direction. Moreover, as this result would predict, using the Kruskal-Wallis test, there was a significant effect of main occupation, as related to art, on percentage of income from art ( $\chi^2 = 84.106$ ,  $df = 4$ ,  $p < 0.001$ ) so that those with art related incomes earn more from their artwork. Thus it appears that earning income from art is a criterion for artistic status (see above). This will now be considered in more detail.

### **10.7. INCOME FROM ARTWORK**

The questionnaire (Appendix 20) considered four aspects of income from artwork; the percentage of artwork at an exhibition that in general will sell (Q9), the minimum and maximum costs of artwork (Q10), and the percentage of income that comes from the artwork (Q11). The correlations in Table 58

demonstrate that the strongest association is between minimum and maximum costs of the artwork ( $r = 0.697$ ,  $p < 0.01$ ) which is unsurprising since it would be expected that the higher the minimum cost would be the higher the maximum cost.

**Table 58. Spearman's Rho Correlations between the Variables Associated with Income made from Artwork**

		1	2	3	4
1	Correlation Coefficient	1.000			
	Sig. (2-tailed)	.			
	N	185			
2	Correlation Coefficient	.121	1.000		
	Sig. (2-tailed)	.119	.		
	N	166	201		
3	Correlation Coefficient	.087	<b>.697(**)</b>	1.000	
	Sig. (2-tailed)	.273	.000	.	
	N	162	193	198	
4	Correlation Coefficient	<b>.380(**)</b>	<b>.362(**)</b>	<b>.500(**)</b>	1.000
	Sig. (2-tailed)	.000	.000	.000	.
	N	181	196	195	227

**\*\*** Correlation is significant at the 0.01 level (2-tailed).  
**Note:**  
 1. = % of artwork displayed at an exhibition that tends to sell.  
 2. = minimum cost of artwork  
 3. = maximum cost of artwork  
 4. = % of income over past 12 months that was made from artwork

All correlations between the percentage of income made from artwork and the other three variables are moderate and significant, as would be anticipated. This variable is likely to be the best indicator of status out of the four income variables as this indicates whether an individual can make a living out of their art which is one definition of a professional that is borne out by a number of comments from the artists themselves (see above). Moreover, using the Kruskal-Wallis test for non-parametric data (since income was not normally distributed), demonstrated that there was a significant effect of self-perceived artistic status on percentage of income ( $\chi^2 = 89.606$ ,  $df = 2$ ,  $p < 0.001$ ) and the medians showed that on average the higher the status the greater the amount of income made from the

artwork as would be expected (professional median = 25.00, range = 0-100, serious median = 1.00, range = 0-90, hobby median = 0.00, range = 0-40). This relationship was also found when time spent was used to measure artistic status ( $\chi^2 = 57.281$ ,  $df = 2$ ,  $p < 0.001$ ) and was in the same direction.

When percentage of income derived from artwork over the past 12 months was correlated with the other variables associated with artistic status, it was found to be significantly correlated with all other variables (Tables 60, 64, 65). To consider which variables may influence the income made from art a parametric procedure is required and a consideration of the data indicated that the data was robust enough to carry out such an analysis. Thus, when a multiple regression analysis was conducted, with percentage of income from artwork as the dependent variable, a significant model emerged ( $F_{11,134} = 11.233$ ,  $p < 0.01$ ) which accounted for 44% of the variance (adjusted  $R^2 = 0.437$ ) and the significant predictor variables were time spent on art ( $\beta = 0.361$ ,  $p < 0.001$ ), number of exhibitions over past 5 years ( $\beta = 0.288$ ,  $p < 0.001$ ), maximum cost of artwork ( $\beta = 0.261$ ,  $p = 0.001$ ), and recognition by other artists ( $\beta = -0.255$ ,  $p = 0.001$ ). The latter result is particularly interesting since this suggests that the desire for recognition by other artists has a negative effect on the percentage of income from artwork.

This close relationship with the other variables believed to be related to artistic status would suggest that percentage of income from art is a good predictor of artistic status. However, there is a difficulty with using income from art as an indicator of artistic status since fine artists have been found to make much more

money from their artwork than applied artists (Stohs, 1990). From the data collected it is not possible to determine whether applied artists have considered their daily work as part of their income from their art or whether they consider the two separately since the majority of the artists did not state whether they were fine or applied artists for the main occupation section.

A further issue is whether there is a difference between the incomes of male and female artists. This may come about due to social issues of inequality and role definition (Stohs, 1992). However, the sexual selection hypothesis would explain any financial inequality by stating that men display their artworks publicly to a greater extent than women since they are competing more intensely to attract mates (Miller, 1999) and thus as a "side effect" this will produce a discrepancy between income made from artworks between the sexes. Using the Mann-Whitney test, a significant difference between men and women in the percentage of their overall income that comes from the sale of their artwork emerged ( $U = 3852.000$ ,  $N_1 = 84$ ,  $N_2 = 143$ ,  $p < 0.001$ , two-tailed) and it is the male artists that are on average earning significantly more than the female artists (median percentage of earnings from artwork for males = 10.00, range = 0-100 and for females = 1.00, range = 0-100).

Interestingly when the data was split on self-perceived status it appears that there is a significant difference between the earnings from art of males and females for professional artists ( $U = 853.500$ ,  $N_1 = 50$ ,  $N_2 = 54$ ,  $p = 0.001$ , two-tailed) and hobby artists ( $U = 187.500$ ,  $N_1 = 12$ ,  $N_2 = 45$ ,  $p = 0.028$ , two-tailed) but not serious artists ( $U = 443.000$ ,  $N_1 = 21$ ,  $N_2 = 44$ ,  $p = 0.783$ , two-tailed).

From the medians it can be seen that for professional artists it is the males who are earning a greater percentage of their income from their art whereas for the hobby artists the medians are the same but there is a much greater range for the male artists (Table 59). However, the numbers for the male hobby and serious artists are low and so caution should be taken with interpreting these results.

**Table 59. Median percentage of income made from artwork for those of different status and sex.**

Status & Sex	Median % of Income made from Artwork	Range
<b>Professional</b>		
Male	50.00	0-100
Female	10.00	0-100
<b>Serious</b>		
Male	1.00	0-20
Female	1.00	0-90
<b>Hobby</b>		
Male	0.00	0-40
Female	0.00	0-3

However, male artists may just charge a greater amount of money for their art than female artists, rather than gaining more income from their artwork due to increased public display. Thus to investigate this a two-way between-subjects analysis of covariance (ANCOVA) was conducted using maximum cost of artwork as the covariate, income from art was the dependent variable and sex and self-perceived status as the two factors. There was a significant main effect of self-perceived status ( $F_{2,187} = 33.434, p < 0.001$ ) and sex of artist ( $F_{1,187} = 4.212, p = 0.042$ ) and a significant interaction between sex and self-perceived status ( $F_{2,187} = 4.540, p = 0.012$ ) and the effect size was 0.387. Therefore once maximum cost of artwork was held constant 39% of the variance in income from artwork was accounted for by sex of the artist and self-perceived status. Thus, it



appears that the sex difference in income from artwork is not due to male artists just asking for greater amounts of money for their artwork.

Furthermore, when time spent was considered as a measure of status the only significant difference was for those who were objectively more professional ( $U = 320.500$ ,  $N_1 = 36$ ,  $N_2 = 28$ ,  $p = 0.012$ ) with professional male artists earning significantly more (median = 57.50, range = 0-100) than professional female artists (median = 10.00, range = 0-100).

Whilst these results could be interpreted as supporting the sexual selection hypothesis that men display their artwork more publicly than females, and therefore will inevitably gain more income from sales of their art this also equally suggests sexual inequality in the opportunities for female artists to gain income from their artwork. Although this issue cannot be resolved from the responses from this study, it is also interesting to consider whether there are sex differences in the numbers and lengths of exhibitions and their relationship to artistic status.

#### **10.8. NUMBERS, LENGTH AND SALES FROM EXHIBITIONS**

From the correlations in Table 60, it can be observed that the three exhibition variables (number of exhibitions over past 5 years, average length of time of an exhibition over past 5 years, percentage of artwork that tends to sell at an exhibition) are mostly weakly but significantly positively correlated with each other.

Interestingly, it is length of exhibition that is most strongly correlated with the other artistic status variables (Table 60) which could suggest that this variable, compared to the other exhibition variables, is most indicative of artistic status. In fact, many hobby artists have exhibitions but the length may be shorter due to the time involved in setting up and running an exhibition which if it is not your profession may be too costly an exercise to hold for too long. Furthermore, the audience for hobby artists may be much more restricted than for professional artists and so professionals are able to have longer exhibitions due to increased interest and attendance at their exhibitions.

Percentage of artwork sold at an exhibition is significantly correlated with very few artistic status variables and none that suggest a professional mental attitude to art (I to L) unlike length of exhibitions. This further supports the proposition that length of exhibition is a stronger indicator of artistic status than the other two exhibition variables.

**Table 60. Spearman's Rho correlations between exhibition variables and other artistic status variables**

		A	B	C
<b>A</b>	Correlation Coefficient	1.00	.300**	.255**
	Sig (2-tailed)	.	.000	.000
	N	186	186	183
<b>B</b>	Correlation Coefficient	.300**	1.00	.138
	Sig (2-tailed)	.000	.	.061
	N	186	235	185
<b>C</b>	Correlation Coefficient	.255**	.138	1.00
	Sig (2-tailed)	.00	.061	.
	N	183	185	185
<b>D</b>	Correlation Coefficient	.174*	.443**	.121
	Sig (2-tailed)	.024	.000	.119
	N	168	201	166
<b>E</b>	Correlation Coefficient	.182*	.451**	.087
	Sig (2-tailed)	.019	.000	.273
	N	164	198	162
<b>F</b>	Correlation Coefficient	.350**	.377**	.380**
	Sig (2-tailed)	.000	.000	.000
	N	181	226	181
<b>G</b>	Correlation Coefficient	.081	-.011	.099
	Sig (2-tailed)	.272	.868	.178
	N	186	235	185
<b>H</b>	Correlation Coefficient	.184*	.423**	.072
	Sig (2-tailed)	.017	.000	.358
	N	168	213	167
<b>I</b>	Correlation Coefficient	.167*	.317**	.023
	Sig (2-tailed)	.023	.000	.753
	N	186	235	185
<b>J</b>	Correlation Coefficient	.012	.134*	-.046
	Sig (2-tailed)	.873	.040	.530
	N	186	235	185
<b>K</b>	Correlation Coefficient	.096	.197**	.044
	Sig (2-tailed)	.193	.002	.549
	N	186	235	185
<b>L</b>	Correlation Coefficient	.114	.286**	-.076
	Sig (2-tailed)	.122	.000	.304
	N	186	235	185

\*. Correlation is significant at the 0.05 level (2-tailed)

\*\*. Correlation is significant at the 0.01 level (2-tailed)

A=number of exhibitions in past 5 years, B=average length of exhibition over past 5 years, C=% of artwork that sells at exhibition, D=minimum cost of artwork, E=maximum cost of artwork, F=% of income from artwork over past 12 months, G=number of years as an artist, H=amount of hours spent on art per week, I=importance of artwork to the artist, J=agreement that art is about taking risks, K=importance of recognition as an artist from public, L=importance of recognition as artist from other artists.

Interestingly, when a multiple regression analysis was conducted with length of exhibitions as the dependent variable and the other artistic status variables (see Table 60) as the independent variables the model was found to be significant ( $F_{11,134} = 2.400$ ,  $p = 0.009$ ) and accounted for 10% of the variance (adjusted  $R^2 =$

.096). The only significant variable was number of hours spent on art per week ( $\beta = 0.219$ ,  $p = 0.037$ ). This result suggests that there are other factors that have a significant influence on length of exhibition that have not been taken into account in this study. Such influential factors may include membership of art associations and institutes and financial assistance from other sources such as partners and parents.

#### **10.8.1. ARTISTIC STATUS AND EXHIBITION VARIABLES**

The Kruskal-Wallis test found a significant effect of self-perceived artistic status for number and length of exhibitions over the past 5 years ( $\chi^2 = 18.174$ ,  $df = 2$ ,  $p < 0.001$  and  $\chi^2 = 62.720$ ,  $df = 2$ ,  $p < 0.001$ , respectively) but not for percentage of artwork sold at an exhibition ( $\chi^2 = 3.185$ ,  $df = 2$ ,  $p = 0.203$ ). Thus, the greater the self-perceived artistic status was the larger the number and the greater the length of time of the exhibitions (Table 61). The result of non-significance for percentage of artworks sold at exhibitions is surprising since it appears that there is no statistically significant difference between professional, serious and hobby artists as to the percentage of artworks sold at exhibitions despite this variable being moderately significantly correlated with percentage of income made from artwork. However, professional artists may sell more artworks, and thereby make the majority of their income, through private commissions rather than at exhibitions, which is less likely to occur for hobby artists.

**Table 61. Medians and Standard Ranges for professional, serious and hobby artists with respect to number of exhibitions, average length of exhibition and average percentage sold at an exhibition over past 5 years.**

		<b>Professional</b>	<b>Serious</b>	<b>Hobby</b>
<b>Number of exhibitions</b>	Median Range	3.00 1-6	2.00 1-6	1.00 1-6
<b>Length of exhibition</b>	Median Range	4.00 0-8	3.50 0-6	0.00 0-5
<b>% sold</b>	Median Range	1.00 0-10	1.00 0-8	1.00 0-6

When time spent was considered there was a significant effect of time spent on length of exhibition ( $\chi^2 = 35.476$ ,  $df = 2$ ,  $p < 0.001$ ) with again increasing artistic status leading to significantly longer exhibitions (low time spent median = 2.00, range = 0-5, medium time spent median = 3.00, range = 0-6, and high time spent median = 4.00, range = 0-8). However, for numbers of exhibitions and percentage of artwork that tends to sell at an exhibition there was no significant effect of time spent ( $\chi^2 = 5.024$ ,  $df = 2$ ,  $p = 0.081$ ) and ( $\chi^2 = 1.441$ ,  $df = 2$ ,  $p = 0.487$ ) respectively.

Thus, it appears that out of the three variables related to exhibitions, length of exhibition is the variable that most accurately reflects artistic status. The relationship between sex of artist and the exhibition variables will now be explored.

### 10.8.2. SEX OF ARTIST AND EXHIBITION VARIABLES

By using the Mann-Whitney test it appears that while there was no significant difference between men and women in the number of exhibitions that they have ( $U = 3518.500$ ,  $N_1 = 74$ ,  $N_2 = 112$ ,  $p = .069$ , two-tailed) there was a significant

difference between the sexes for length of exhibition ( $U = 4538.500$ ,  $N_1 = 85$ ,  $N_2 = 150$ ,  $p < 0.001$ , two-tailed) and percentage of artworks sold at exhibitions ( $U = 3287.500$ ,  $N_1 = 73$ ,  $N_2 = 112$ ,  $p = .020$ , two-tailed). Thus, although men and women appear to exhibit at similar numbers of exhibitions men are exhibiting for longer and selling a greater percentage of their work (since there is a greater range for men) (Table 62). These results provide mixed support for sexual selection theory since both sexes are displaying as often in public, which argues against Miller's supposition that men display their creative products more publicly than women due to their greater competition for mates, but men are displaying for longer which does supports Miller's hypothesis.

**Table 62. Differences between males and females in medians and ranges on the number, length and % of artwork sold at an exhibition.**

		Male	Female
Number of exhibitions	Median	2.00	2.00
	Range	1-6	1-6
Length of exhibitions	Median	4.00	3.00
	Range	0-8	0-6
Percentage of work sold at an exhibition	Median	1.00	1.00
	Range	0-10	0-8

### 10.8.3. PUBLIC DISPLAY

In an attempt to clarify whether men are displaying their artworks more than women the data for how many exhibitions had the artists exhibited in over the past 5 years was recoded so that the lower value was taken for each category. For example, 1-5 exhibitions became 1 exhibition and more than 25 exhibitions became 25 exhibitions. A similar process was carried out for average length of exhibition over the past 5 years, although all lengths were also converted into days, so that 3-6 days became 3 days and more than 1 year became 365 days.

These two variables were then computed into a variable that indicated the number of days of public display in the past 5 years. Although the results are only crude estimates of the actual amount of display this should provide some indication of whether there is a difference between men and women in the degree of public display. Furthermore, due to a number of outliers for both the male and female artists the variable public display was converted to a log scale

The results demonstrate that there is a significant difference between men and women in the amount of time (in days) that they spend in publicly displaying their artwork ( $U = 3078.500$ ,  $N_1 = 74$ ,  $N_2 = 111$ ,  $p = 0.004$ , two-tailed). Furthermore, it is male artists who display their artwork for longer than female artists (for men median = 2.12, range = 0.00-3.96 and for females median = 1.48, range = 0.00-3.11). However, it must be remembered that there are some female artists in this study displaying more than the majority of men and some male artists displaying less than many women artists thus support for Miller's hypothesis is not clear cut. Moreover these results cannot be interpreted as occurring due to the desire for men to use their artworks as fitness indicators. There are many other reasons why there may be a sex difference such as opportunities and social expectations on women which reduce their display time (Stohs, 1992). However, Miller's (1999) three samples consisted of professional musicians, artists and writers. Therefore to be able to more accurately compare the results from this study with Miller's work the file was split on self-perceived status and a Mann-Whitney test conducted using the variables sex and public display. These results demonstrated that for self-perceived professional artists there was no effect of sex on public display ( $U = 999.500$ ,  $N_1 = 46$ ,  $N_2 = 53$ ,  $p =$

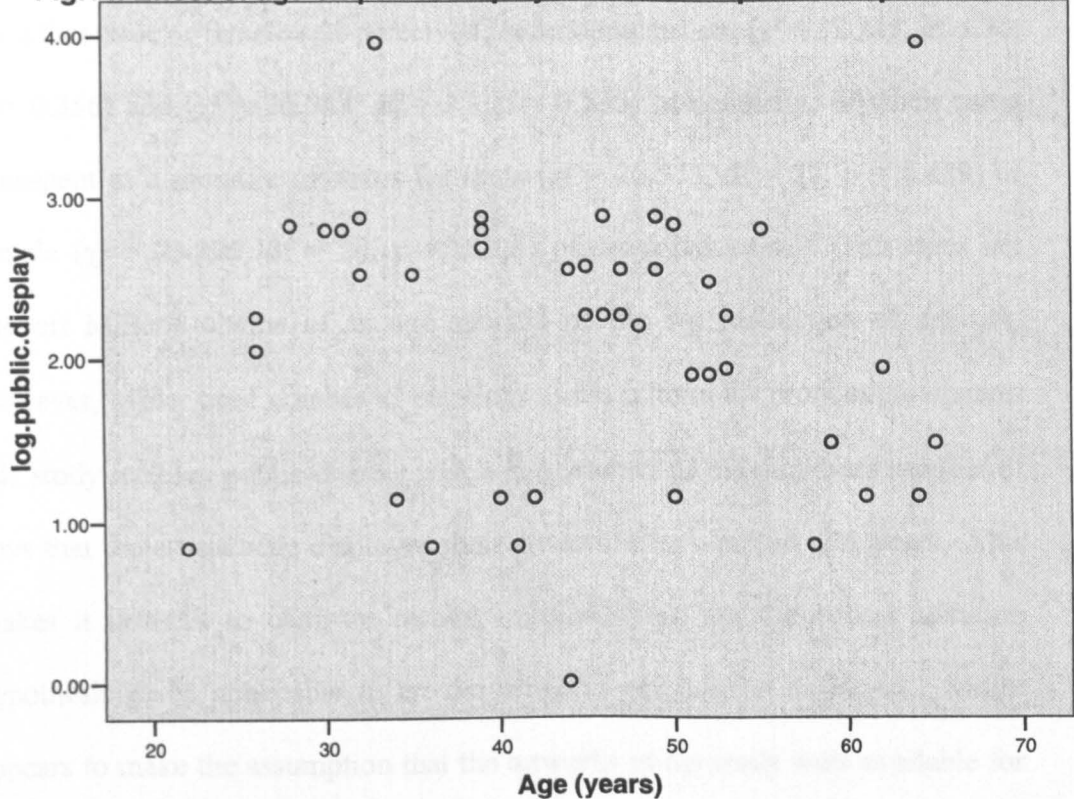
0.123, two-tailed). Nevertheless, when time spent was used as a measure of artistic status there was a significant effect of sex on public display for professional artists ( $U = 335.500$ ,  $N_1 = 34$ ,  $N_2 = 29$ ,  $p = 0.029$ , two-tailed) with male professional artists displaying for significantly more days (median = 2.30, range = 0.00-3.96) than female professional artists (median = 1.62, range = 0.48-2.68). Thus when a more objective measure of artistic status is considered there is found to be support for Miller's claims for sexual dimorphism in public display.

Moreover, Miller (1999) claims that the amount of production and therefore the amount of public display increases rapidly after puberty, peaks at young adulthood when sexual competition is greatest and diminishes for men once they marry and have children but this effect is not seen for women. However, when the data was split on sex and the Kruskal-Wallis test computed to look at the effect of age on amount of public display there was found to be no significant effect for either men ( $\chi^2 = 48.875$ ,  $df = 40$ ,  $p = 0.159$ ) or women ( $\chi^2 = 50.584$ ,  $df = 43$ ,  $p = 0.199$ ), thus refuting Miller's (1999) hypothesis with respect to the age profile.

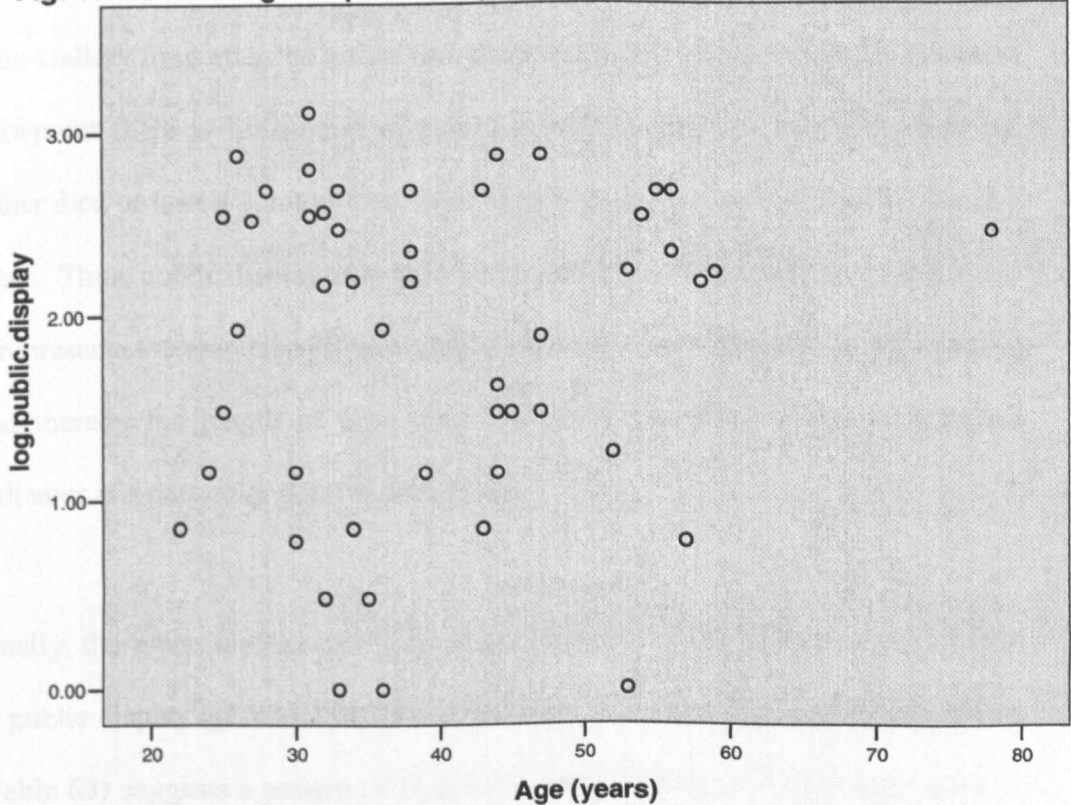
However, to be able to more accurately compare the results from this study with Miller's work again the file was split on status and sex and the Kruskal-Wallis test was then conducted and scatter charts were produced to provide a clearer visual image of the effect of age on public display for professional male and female artists only (Fig. 14 & 15).



**Fig.14. Effect of age on public display for male self-perceived professional**



**Fig. 15. Effect of age on public display for female self-perceived professional**



Thus, it was found that there was no significant effect of age on public display for either male or female self-perceived professional artists, ( $\chi^2 = 32.245$ ,  $df = 30$ ,  $p = 0.356$ ) and ( $\chi^2 = 26.047$ ,  $df = 27$ ,  $p = 0.516$ ) respectively, or when using timespent as a measure of status for male ( $\chi^2 = 26.573$ ,  $df = 27$ ,  $p = 0.489$ ) or female ( $\chi^2 = 23.296$ ,  $df = 20$ ,  $p = 0.275$ ) professional artists. This does not support Miller's claims of an age specific profile for production of artwork. However, Miller used number of paintings as his criteria for production whereas this study looks at public display which is a product of the minimum number of days that the artists have displayed their artwork over a period of 5 years. This makes it difficult to compare results. Nevertheless, for the sexual selection hypothesis to be applicable to art the artworks need to be displayed. Miller appears to make the assumption that the artworks in his study were available for public display at the time that the artist produced them. This is not necessarily the case. Some of the paintings in Miller's study may have been brought by The Tate Gallery long after the artists had produced them. From the sexual selection viewpoint there is little point in paintings being displayed after the artist has either died or is at a point in their lives when sexual competition is no longer at a peak. Thus, public display may be a better indicator of cultural production since it represents the amount of time an artist's works are available for public viewing and thereby the length of time their artwork is available to act as a fitness indicator at a particular point in their lives.

Finally, there was also a significant effect of level of artistic training on amount of public display ( $\chi^2 = 13.116$ ,  $df = 4$ ,  $p = .011$ ). A consideration of the medians (Table 63) suggests a pattern of increased public display with increased level of

artistic training. This may be partly associated with the networks available to those artists who study to a higher level which may allow them to gain contacts who can promote their work through exhibitions. However the relationship is not completely linear since those with no qualifications actually have higher public display scores than those at GCSE/A' Level and diploma level.

**Table 63. Medians and ranges for amount of public display (number of days in the past 5 years) for each level of training.**

Highest Level of Training	Median	Range
None	30.00	1-9125
GCSE/A'Level	16.00	1-224
Diploma	22.00	1-480
Degree	42.00	1-750
Postgraduate	154.00	6-1281

### 10.9. TIME SPENT ON ART

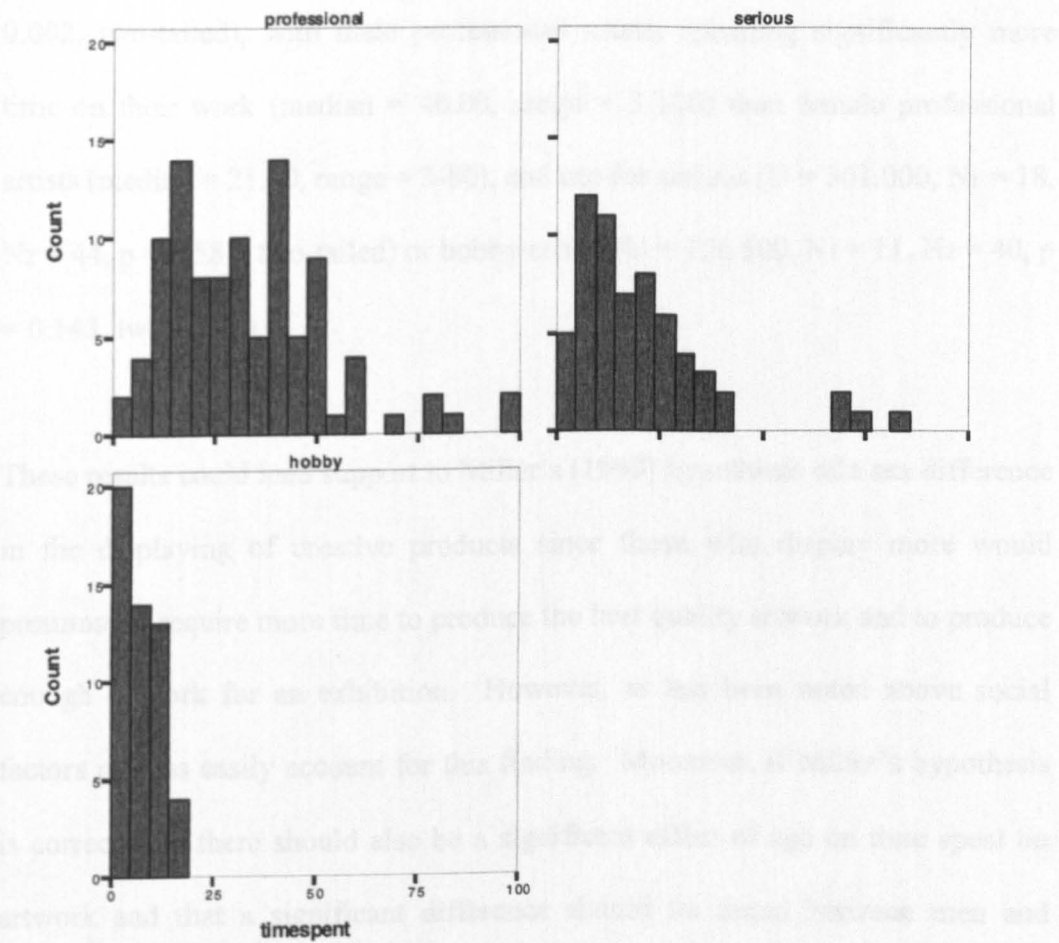
Time spent has already been found to be the variable within section A that is most strongly associated with artistic status (see factor analysis) and this also appears to be supported by some of the implicit views of the artists in this study. In fact, one artist who stated that he/she was a hobby artists wrote “I want to be “A serious artist”, but if I were really serious I would spend more time on my work”.

Moreover, the frequencies for time spent between self-perceived professional, serious and hobby artists also support the relationship between time spent and artistic status (Fig. 16). In fact there is a significant effect of self-perceived artistic status on time spent on artwork ( $\chi^2 = 89.857$ ,  $df = 2$ ,  $p<0.001$ ) with significantly more time spent on art the greater the self-perceived status of the

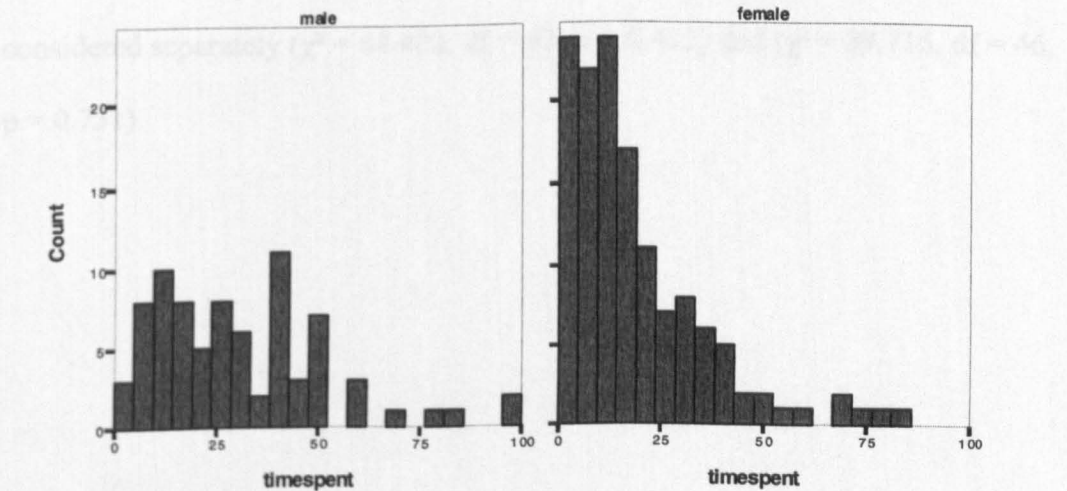
artists (professional artists median = 30.00, range = 3-100, serious artists median = 15.00, range = 0-84, and hobby artists median = 5.00, range = 0-15). This finding supports the hypothesis that time spent on art is an indicator of artistic success although there is a considerable range within each of the self perceived status variables (see fig. 16).

Interestingly, there is also a significant difference between men and women artists in the average amount of time they spend on their artwork per week ( $U = 3374.500$ ,  $N_1 = 79$ ,  $N_2 = 135$ ,  $p < 0.001$ , two-tailed) (Fig.17). This difference appears to be due to male artists (median = 25.00, range = 1-100) spending on average more time on their artwork than female artists (median = 14.00, range = 0-84).

**Fig. 16. Distribution of time spent on artwork per week (in hours) by self-perceived professional, serious and hobby artists.**



**Fig. 17. Distribution of time spent on artwork per week (in hours) for male and female participants**



However, when the data was split on self-perceived status the significant sex difference only held for professional artists ( $U = 795.500$ ,  $N_1 = 49$ ,  $N_2 = 51$ ,  $p = 0.002$ , two-tailed), with male professional artists spending significantly more time on their work (median = 40.00, range = 3-100) than female professional artists (median = 21.00, range = 3-80), and not for serious ( $U = 361.000$ ,  $N_1 = 18$ ,  $N_2 = 44$ ,  $p = 0.587$ , two-tailed) or hobby artists ( $U = 156.500$ ,  $N_1 = 11$ ,  $N_2 = 40$ ,  $p = 0.143$ , two-tailed).

These results could lend support to Miller's (1999) hypothesis of a sex difference in the displaying of creative products since those who display more would presumably require more time to produce the best quality artwork and to produce enough artwork for an exhibition. However, as has been noted above social factors may as easily account for this finding. Moreover, if Miller's hypothesis is correct then there should also be a significant effect of age on time spent on artwork and that a significant difference should be found between men and women on these variables. However, using the Kruskal-Wallis Test there was no significant effect of age on time spent ( $\chi^2 = 47.958$ ,  $df = 50$ ,  $p = 0.556$ ) and this did not become significant when the ages of male and female artists were considered separately ( $\chi^2 = 44.402$ ,  $df = 43$ ,  $p = 0.412$ ) and ( $\chi^2 = 39.715$ ,  $df = 46$ ,  $p = 0.731$ ).

**Table 64. Spearman's Rho correlation coefficients for variables associated with time and financial benefits of being an artist.**

		<b>Years as artist</b>	<b>Timespent</b>	<b>Min. cost</b>	<b>Max. cost</b>	<b>% income from artwork</b>
<b>Years as artist</b>	Correlation coeff Sig. (2-tailed) N	1.000 . 236	<b>.159*</b> <b>.020</b> <b>214</b>	-.007 .924 201	.098 .170 198	<b>.155*</b> <b>.019</b> <b>227</b>
<b>Timespent</b>	Correlation coeff Sig. (2-tailed) N	<b>.159*</b> <b>.020</b> <b>214</b>	1.000 . 214	<b>.398**</b> <b>.000</b> <b>185</b>	<b>.555**</b> <b>.000</b> <b>183</b>	<b>.561**</b> <b>.000</b> <b>207</b>
<b>Min. cost</b>	Correlation coeff Sig. (2-tailed) N	-.007 .924 201	<b>.398**</b> <b>.000</b> <b>185</b>	1.000 . 201	<b>.697**</b> <b>.000</b> <b>193</b>	<b>.362**</b> <b>.000</b> <b>196</b>
<b>Max. cost</b>	Correlation coeff Sig. (2-tailed) N	.098 .170 198	<b>.555**</b> <b>.000</b> <b>183</b>	<b>.697**</b> <b>.000</b> <b>193</b>	1.000 . 198	<b>.500**</b> <b>.000</b> <b>195</b>
<b>% income from artwork</b>	Correlation coeff Sig. (2-tailed) N	<b>.155*</b> <b>.019</b> <b>227</b>	<b>.561**</b> <b>.000</b> <b>207</b>	<b>.362**</b> <b>.000</b> <b>196</b>	<b>.500**</b> <b>.000</b> <b>195</b>	1.000 . 227

\*. Correlation is significant at the 0.05 level (2-tailed)

\*\*. Correlation is significant at the 0.01 level (2-tailed)

**Table 65. Spearman's Rho correlation coefficients for variables associated with mental attitudes to being an artist.**

		<b>Important aspect of life</b>	<b>Art is about taking risks</b>	<b>Importance of recognition by public</b>	<b>Importance of recognition by other artists</b>
<b>Years as artist</b>	Correlation coeff Sig. (2-tailed) N	<b>.167*</b> <b>.010</b> <b>236</b>	<b>.067</b> <b>.309</b> <b>236</b>	<b>.100</b> <b>.127</b> <b>236</b>	<b>.055</b> <b>.400</b> <b>236</b>
<b>Timespent</b>	Correlation coeff Sig. (2-tailed) N	<b>.598**</b> <b>.000</b> <b>214</b>	<b>.148*</b> <b>.031</b> <b>214</b>	<b>.217**</b> <b>.001</b> <b>214</b>	<b>.253**</b> <b>.000</b> <b>214</b>
<b>Min. cost</b>	Correlation coeff Sig. (2-tailed) N	<b>.309**</b> <b>.000</b> <b>201</b>	<b>.116</b> <b>.101</b> <b>201</b>	<b>.165</b> <b>.019</b> <b>201</b>	<b>.216***</b> <b>.002</b> <b>201</b>
<b>Max. cost</b>	Correlation coeff Sig. (2-tailed) N	<b>.395**</b> <b>.000</b> <b>198</b>	<b>.121</b> <b>.090</b> <b>198</b>	<b>.117</b> <b>.099</b> <b>198</b>	<b>.188**</b> <b>.008</b> <b>198</b>
<b>% income from artwork</b>	Correlation coeff Sig. (2-tailed) N	<b>.338**</b> <b>.000</b> <b>227</b>	<b>.159*</b> <b>.016</b> <b>227</b>	<b>.245**</b> <b>.000</b> <b>227</b>	<b>.147*</b> <b>.027</b> <b>227</b>
<b>Important aspect of life</b>	Correlation coeff Sig. (2-tailed) N	1.000 . 236	<b>.091</b> <b>.164</b> <b>236</b>	<b>.330**</b> <b>.000</b> <b>236</b>	<b>.311**</b> <b>.000</b> <b>236</b>
<b>Art is about taking risks</b>	Correlation coeff Sig. (2-tailed) N	<b>.091</b> <b>.164</b> <b>236</b>	1.000 . 236	<b>.038</b> <b>.556</b> <b>236</b>	<b>.133*</b> <b>.041</b> <b>236</b>
<b>Importance of recognition by public</b>	Correlation coeff Sig. (2-tailed) N	<b>.330**</b> <b>.000</b> <b>236</b>	<b>.038</b> <b>.556</b> <b>236</b>	1.000 . 236	<b>.519**</b> <b>.000</b> <b>236</b>
<b>Importance of recognition by other artists</b>	Correlation coeff Sig. (2-tailed) N	<b>.311**</b> <b>.000</b> <b>236</b>	<b>.133*</b> <b>.041</b> <b>236</b>	<b>.519**</b> <b>.000</b> <b>236</b>	1.000 . 236

\*. Correlation is significant at the 0.05 level (2-tailed)

\*\*. Correlation is significant at the 0.01 level (2-tailed)

The correlations for average time spent on artwork and the other variables associated with artistic production can be observed in tables 60, 64 and 65. It can be seen that time spent on artwork has a significant positive relationship with all the variables apart from "percentage of artwork sold at an exhibition". Thus, it not only has an association with other artistic behaviours but also with mental



attitudes believed to be indicative of artistic professionalism. Furthermore, when a multiple regression analysis was conducted, with time spent as the dependent variable, the model was found to be significant ( $F_{11,134} = 9.589$ ,  $p < 0.001$ ) and accounted for 40% of the variance (adjusted  $R^2 = .395$ ). The significant predictor variables were percentage of income from artwork ( $\beta = .388$ ,  $p < 0.001$ ), importance of artwork in life ( $\beta = .300$ ,  $p < 0.001$ ), importance of recognition by public ( $\beta = -.272$ ,  $p = 0.001$ ), and importance of recognition by other artists ( $\beta = .216$ ,  $p = 0.009$ ). This indicates that time spent on artwork is associated with an internal drive to produce art and achieve recognition by other artists which would support it's associated with professionalism and possibly success since percentage of income from artwork is the strongest predictor. Interestingly, recognition by the public is negatively associated with time spent on art which may imply an association with fame and celebrity that may be believed to discredit genuine artists.

#### **10.10. TIME AS AN ARTIST**

Research has shown that it takes approximately ten years before a person can produce a major work (Simonton, 1999) and therefore be said to have mastered their profession and hence use the term professional. However, some artists implied that they believed themselves to have been artists for the whole of their lives since for them it is not merely a job but a fundamental part of themselves, and so this sort of belief may also be associated with professional status. One artist stated "I said I was an artist for 38yrs. I'm 38yrs old. When you're an artist it's unfortunately a vocation, whether you like it or not. It is the albatross".

Unsurprisingly, there was a significant correlation between time as an artist and age of participant ( $\rho = 0.440$ ,  $p < 0.001$ ). When a one-way ANCOVA was conducted using age of artist as the covariate there was found to be no significant effect of self-perceived status ( $F_{2,226} = 0.267$ ,  $p = 0.766$ ) or time spent ( $F_{2,207} = 2.142$ ,  $p = 0.120$ ) on time as an artist. Thus, once artist's age is held constant the number of years that one has been an artist does not appear to be related to artistic status.

Moreover, correlations with other variables associated with artistic status are either weak and significant or non-significant (see tables 60, 64 & 65). Thus, time as an artist does not appear to be as strongly associated with artistic status as do some of the other artistic variables in section A of the questionnaire (Appendix 20).

#### **10.11. MENTAL ATTITUDES OF ARTISTS**

Questions 12 to 15 aimed to capture mental attitudes and beliefs that may indicate the degree of professionalism of the artist. From Table 65 it can be observed that "the importance of recognition from other artists" is significantly positively correlated with all the other mental attitude variables and most strongly with "recognition by the general public" ( $\rho = 0.519$ ,  $p < 0.001$ ). Feedback comments suggested that one of the reasons for wanting recognition by other artists was to receive support. One artist wrote "peer group acceptance...means you are part of a community of artists (being an artist can be very lonely). Getting together to discuss each other's work is very interesting and rewarding".

However, there was some concern that other artists may not be honest in their responses. There was also an emphasis by some artists on receiving recognition by artists of similar or greater ability than themselves but not from those with apparently less ability or status.

The attitude variable significantly correlated with the lowest number of variables was the “belief that art is about taking risks” and, in fact, all the significant correlations were weak. Whether an artist considers art to be about taking risks may have less to do with professionalism, at least when considering professionalism as amount of income made from artwork, since taking a risk in one’s artwork could reduce income if the risk does not work out and may also lead to reductions in opportunities to exhibit art. In fact, one artist wrote “...taking risks can make your work less saleable, so there has to be a mixture of ‘risk’ stuff and more commercial stuff”. Thus, those artists who do believe that art is about taking risks may not earn the majority of their income from their artwork or be concerned with exhibiting their work. This would suggest that professional artists, if defined by the income that they make from their artwork, may not hold this view. In fact, the Kruskal-Wallis test demonstrated that there was no significant effect of self-perceived status ( $\chi^2 = 3.578$ ,  $df = 2$ ,  $p = 0.167$ ) or time spent ( $\chi^2 = 5.685$ ,  $df = 2$ ,  $p = 0.058$ ) on art being about taking risks. However, other artists considered the statement to be about taking risks purely in their artwork and linked this with professionalism. One artist wrote “people cannot discover new oceans until they have the courage to lose sight of the shore”. Thus, these non-significant results may be due to different interpretations of the term risk.

Conversely there was, using the Kruskal-Wallis test, a significant effect of self-perceived status on the importance of art in life ( $\chi^2 = 74.935$ ,  $df = 2$ ,  $p < 0.001$ ), recognition by public ( $\chi^2 = 34.270$ ,  $df = 2$ ,  $p < 0.001$ ) and recognition by other artists ( $\chi^2 = 42.441$ ,  $df = 2$ ,  $p < 0.001$ ). It appears that for the importance of recognition by the public and other artists the significant difference stems from the responses of the hobby artists compared to the other two groups (Table 66). In both cases the hobby artists rate these attitudes as being less important than the other groups of artists as would be expected.

**Table 66. Medians and ranges of attitudes to art for artists of different status**

		Professional artists	Serious artists	Hobby artists
<b>Importance of art</b>	Median	9.00	8.00	7.00
	Range	3-10	5-10	1-10
<b>Recognition by public</b>	Median	6.00	6.00	3.00
	Range	0-10	1-10	1-10
<b>Recognition by other artists</b>	Median	8.00	8.00	3.00
	Range	1-10	1-10	0-10

The effect of time spent on the importance of art ( $\chi^2 = 72.521$ ,  $df = 2$ ,  $p < 0.001$ ), recognition by the public ( $\chi^2 = 11.273$ ,  $df = 2$ ,  $p = 0.004$ ) and recognition by other artists ( $\chi^2 = 13.315$ ,  $df = 2$ ,  $p = 0.001$ ) was significant and again it appears that hobby artists (low time spent) value these attitudes less than artists of higher status (Table 67).

**Table 67. Medians and ranges of attitudes to art for timespent**

		High spent	Time	Medium pent	Time	Low Time spent
<b>Importance of art</b>	Median Range	9.00 5-10		8.00 3-10		7.00 1-10
<b>Recognition by public</b>	Median Range	6.00 1-10		6.00 0-10		4.00 1-10
<b>Recognition by other artists</b>	Median Range	7.50 1-10		8.00 2-10		6.00 1-10

Interestingly, when the effect of sex on these attitude variables was analysed there was only a significant effect of sex on importance of art in life ( $U = 5042.500$ ,  $N_1 = 85$ ,  $N_2 = 151$ ,  $p = 0.005$ , two-tailed) and this appeared to be due to a slight increase in the importance of art for male artists (for male artists median = 9, range = 2-10 and for female artists median = 8, range = 1-10). This may be due to the expectation within society on women to continue to act as the primary carer of the children even when working. As one female artist stated "...things get in the way like working to earn money (often to pay for materials and equipment), partner and his work (he earns more than I do), and family. There are times when, no matter how vital art is in my life it has to take a back seat". However a number of the men, as well as the women, participants mentioned the importance of their family as well as their artwork and creating a balance between the two. Moreover, some comments on this question suggested that those who have other creative activities in their lives may also lower the ratings for importance of art in life and so if combined the creative activities may together produce a much higher rating.

A consideration of the effect of age on these different attitudes demonstrated no significant effects (Table 68). Thus, particular attitudes about art do not appear to be influenced by the age of the artist.

**Table 68. Results of Kruskal-Wallis Test to determine effects of age on attitudes to art. Test Statistics(a,b)**

	recog. by public	recog. by other artists	imp. of art in life	risks
Chi-Square	36.195	49.258	53.048	46.815
df	51	51	51	51
Asymp. Sig.	.942	.543	.395	.640

a Kruskal Wallis Test

b Grouping Variable: age (years)

However, one variable that did appear to influence attitudes was the amount of formal arts training the artists had received. Thus, formal arts training had a significant effect on “importance of recognition by the public” ( $\chi^2 = 16.940$ ,  $df = 8$ ,  $p = 0.031$ ), “importance of recognition by other artists” ( $\chi^2 = 23.921$ ,  $df = 8$ ,  $p = 0.002$ ), and “the importance of art to the artist’s life” ( $\chi^2 = 38.632$ ,  $df = 8$ ,  $p < 0.001$ ), but not to whether “art is about taking risks” ( $\chi^2 = 7.863$ ,  $df = 8$ ,  $p = 0.447$ ).

From the medians and ranges (Table 69) it is difficult to identify where the significant differences occur although there does appear to be some increase in the importance of art in their lives the higher their academic status, which is unsurprising due to the high level of investment, in terms of time and financial cost that is involved in gaining academic qualifications. There also appears to be an increase in the desire for recognition from other artists and a peak in desire for recognition by the public at the diploma/foundation level which reduces as the

artist gains further qualifications. This latter pattern may reflect the possible insecurities and need for general acknowledgement when artists have started on the road to formal artistic qualifications as they become aware of the status of others more qualified than themselves but then reduces as their academic status increases.

**Table 69. Median and range for attitudes by level of formal arts training**

		0	1	2	3	4	5	6	7	8
<b>Number</b>		43	18	13	11	18	82	5	32	2
<b>Imp. Of art</b>	Median	8	6.5	8	7	9	8	8	9	10
	Range	1-10	3-10	1-10	1-9	6-10	5-10	7-9	5-10	10
<b>Risks</b>	Median	8	7	7	7	7	8	6	8	10
	Range	1-10	1-10	3-10	3-10	1-10	0-10	1-10	4-10	10
<b>Recog. Public</b>	Median	4	4	6	5	8	6	6	6	4
	Range	1-10	1-7	1-8	1-8	1-10	1-10	5-8	1-10	1-7
<b>Recog. other artists</b>	Median	6	6	5	5	6	7	8	8	8.5
	Range	1-10	1-10	1-10	1-10	0-10	1-10	8-10	1-10	7-10

**Note:** 0= no formal training, 1=apprentice, 2=GCSE/O'level/CSE, 3 =AS/A'level, 4=city & guilds/diploma, 5=degree, 6=postgraduate diploma, 7=masters, 8=PhD

Interestingly, from some of the comments made by the artists it appears that recognition by the public was linked with celebrity or star status so whilst on the whole the artists wished for serious recognition of their artwork they did not desire fame. As one artist stated "...I crave recognition of my abilities, rather than fame. Fame is a trap".

Thus, the importance of art in the artist's life and recognition by the public and other artists do appear to be associated with artistic status. However, the results for whether art is about taking risks were more ambiguous due it appears to different interpretations of this statement.

## **10.12. SUMMARY OF ARTISTIC BEHAVIOURS AND BELIEFS**

Overall the variables considered within section A of the questionnaire appear to be relevant to artistic status as defined by the artists themselves. Those most closely associated with artistic status were found in the first factor of the principal components analysis and so time spent on art, importance of art in life, percentage of income from art, and public display can be said to most clearly indicate artistic status, with higher values of each equating to greater professional status.

This first section has also enabled a test of Miller's (1999) hypotheses regarding sexual dimorphism and the age profile in public display. With regards to the former, the results from this study support the prediction that overall male artists engage in more public display than female artists. Moreover, when the results only considered male and female professional artists, to more accurately reflect Miller's (1999) sample, it was found that there was a significant effect of sex on public display when using the time spent variable as a measure of artistic status. However, Miller's (1999) claim that artistic production peaks during young adulthood and then gradually declines once parenting overtakes the need for courtship is not supported by the results from this study across either all participants or for the professional artists alone. Whilst public display is used, rather than Miller's variable of number of paintings, this may be found to be a more accurate indicator for the sexual selection hypothesis since it does not assume that production equates with display of all artworks within the public domain. However, the results regarding public display may also be a product of the sample of artists in this study since the sample of artists is much more diverse



than Miller's. Nevertheless, the sexual selection hypothesis should be applicable to all artists and not just the more celebrated professional artists who are exhibited at such prestigious venues as the Tate Gallery.

The next section will consider the effects of personality on artistic status and mating success.

### 10.13. PERSONALITIES OF ARTISTS AND THEIR PARTNERS

The personalities of the artists and their partners were measured using a fifty item version of the five factor model (Goldberg, 1999). The internal consistency of each of the five factors was measured using Cronbach alphas (Table 70).

**Table 70. Comparison of Cronbach alphas for the artists and the artists' ratings of their partners and the IPIP for the five factor model**

Five Factors (10 item scale of the IPIP)	Cronbach alphas from the IPIP	Cronbach alphas for the artists	Cronbach alphas for the artists ratings of their partners
Neuroticism	.86	.86	.87
Extraversion	.86	.82	.90
Openness	.82	.62	.89
Agreeableness	.77	.79	.92
Conscientiousness	.81	.75	.91
Mean	.82	.77	.90

Thus, the Cronbach alphas from this study are in general comparable to those found by Goldberg (1999). Furthermore, whilst there appears to be some discrepancies in the literature as to what is considered an acceptable level of reliability, it can be argued that these alphas demonstrate satisfactory internal consistency (Bland & Altman, 1997, Heyland et al., 2000).

### 10.13.1. ARTISTS' SELF-RATINGS OF PERSONALITY

To consider the distribution of the personality scores for the artists (Table 71) in this study the scores can be compared to data from Nettle of a general population of internet users (as used in Chapter 7) (Tables 72).

**Table 71. Frequency Statistics for self-rated personality scores of the artists**

		Artist. Neuroticism	artist. extraversion	artist. openness	artist. agreeable ness	artist. conscienti ousness
N	Valid	236	236	236	236	236
	Missing	0	0	0	0	0
Mean		28.7585	32.8771	41.3983	37.5085	36.6398
Median		29.0000	34.0000	42.0000	38.0000	37.0000
Std. Deviation		8.27383	7.13023	5.13750	6.38115	6.46180
Skewness		.063	-.189	-.660	-.426	-.324
Std. Error of Skewness		.158	.158	.158	.158	.158
Kurtosis		-.528	-.437	-.087	-.407	-.320
Std. Error of Kurtosis		.316	.316	.316	.316	.316
Range		11-49	15-49	28-50	20-50	20-50

**Table 72. Norms for the five factor personality domains from a general population sample**

	Overall Mean	Overall SD	Low Score		Medium Low Score		Medium High Score		High Score	
			Males	Females	Males	Females	Males	Females	Males	Females
Neuroticism	30.82	8.545	10-23	10-25	24-29	26-32	30-36	33-39	37-50	40-50
Extraversion	31.55	8.531	10-23	10-25	24-31	26-33	32-37	34-40	38-50	41-50
Openness	38.64	5.646	10-38	10-37	39-41	38-41	42-45	42-45	46-50	46-50
Agreeableness	41.08	5.903	10-33	10-39	34-37	40-44	38-42	45-47	43-50	48-50
Conscientiousness	34.48	7.189	10-30	10-29	31-35	30-34	36-40	35-39	41-50	40-50

Thus, overall the mean scores and standard deviations do not differ greatly from the provided norms, with the artists' means for neuroticism and agreeableness being slightly lower and extraversion, openness and conscientiousness being slightly higher. This suggests that the personalities of the artists do not differ greatly from a general population sample that completes online questionnaires. However, in general other studies have found artists to be high in openness, low in conscientiousness, high in neuroticism and mixed in introversion and extraversion (Dollinger et al., 2004, Feist, 1998, Gotz & Gotz, 1973, McCrae, 1987, McCrae & Costa, 1997, Nowakowska et al., 2004, Walker et al., 1995). These opposing results may be due to the personality of the artist who is prepared to participate in and complete a study that asks questions of a sexual nature. In light of this the results of higher conscientiousness and extraversion are unsurprising. Nevertheless, the results for openness are surprising since this trait is so closely associated with artists. This may be a problem with the norms not being appropriate to use with this sample since the participants in the norm sample came from America. However, it may also be that there is a difference in the levels of openness depending on the artistic status of the artist and this will be explored below.

#### **10.13.1.1 Sex differences in the artists' personality ratings**

An analysis of possible sex differences in the self-rated personality traits found no significant differences between men and women in their scores for any of the five personality traits (Table 73). This is contrary to the findings in the literature that find that women tend to score more highly than men on extraversion (particularly those facets of extraversion related to warmth, gregariousness and

positive emotions), neuroticism, agreeableness, and openness to feelings, and men tend to score more highly than women on the extraversion facet of assertiveness, and on openness to ideas (Costa et al., 2001, Feingold, 1994). Nevertheless Costa, Terracciano et al (2001) found that the size of the gender differences varied between cultures with gender differences being largest in prosperous, healthy cultures where women have greater educational opportunities. Whilst this study consists of participants primarily from a white British culture it may be that there are also differences in the degree of gender differences in personality for subcultures, such as the Arts world, which may explain the lack of significant differences in personality between male and female artists. However, it may also be that specific personality types are attracted to such studies regardless of sex and this explains the lack of personality differences between the sexes.

**Table 73. Effect of sex of artist on self-rated personality scores. Test Statistics(a)**

	Artist.Neurotic ism	artist.extraver sion	artist.open ess	artist.agre eableness	artist.cons cientiousn ess
Mann-Whitney U	5516.000	5759.000	6294.500	5503.500	5938.500
Wilcoxon W	9171.000	9414.000	9949.500	9158.500	17414.500
Z	-1.792	-1.309	-.245	-1.818	-.953
Asymp. Sig. (2-tailed)	.073	.190	.807	.069	.341

a. Grouping Variable: sex

#### **10.13.1.2. Self-rated status and the personalities of the artists**

There was a significant effect of self-perceived status on all personality variables except agreeableness (Table 74). For extraversion, openness and conscientiousness there is a general reduction in the levels of these traits from

professional to hobby artists (Table 74). Nevertheless, for openness, which would be expected to be at high levels in professional artists, the mean for the professional artists (42.64) would only be considered medium high when compared to the norms above (Table 72). This again suggests that either this sample of artists are lower in openness than would be anticipated or that the participants that constructed the norms were particularly high on this trait. Interestingly, for neuroticism there appears to be a peak for serious artists and more similar levels for professional and hobby artists.

**Table 74. Medians and ranges for personality scores of professional, serious and hobby artists.**

	Test Statistics		Professional	Serious	Hobby
<b>Neuroticism</b>	$\chi^2 = 7.387$ df = 2 p = 0.025	Median Range	28.00 11-49	31.00 13-48	29.00 12-47
<b>Extraversion</b>	$\chi^2 = 15.422$ df = 2 p < 0.001	Median Range	35.00 15-49	33.00 19-49	28.00 16-43
<b>Openness</b>	$\chi^2 = 27.319$ df = 2 p < 0.001	Median Range	43.50 28-50	42.50 29-50	38.00 28-49
<b>Agreeableness</b>	$\chi^2 = 4.277$ df = 2 p = 0.118	Median Range	39.00 23-50	37.00 24-48	39.00 20-50
<b>Conscientiousness</b>	$\chi^2 = 19.679$ df = 2 p < 0.001	Median Range	39.00 23-50	36.50 20-50	35.00 20-45

Using time spent as a measure of artistic status, a Kruskal-Wallis test found that there was a significant effect of status on conscientiousness ( $\chi^2 = 10.956$ , df = 2, p = 0.004) and openness to experience ( $\chi^2 = 10.375$ , df = 2, p = 0.006) but not on any of the other personality traits.

Furthermore, the results were in the expected direction for openness from professional to hobby status (as defined by time spent on art) (Table 75). The results for conscientiousness were also in the same direction. However, in previous research the opposite relationship with conscientiousness has been found so that the more professional the artist the less conscientious they would be predicted to be (Feist, 1998, Furnham & Chamorro-Premuzic, 2004, Nowakowska et al., 2004, Walker et al., 1995). This may therefore be a product of the sample so that on average only more conscientious artists were prepared to complete the questionnaire. Nevertheless, this trait may be important in gaining professional status as it should ensure that work is completed and exhibited which should help to raise the status of the artist.

**Table 75. Medians and ranges for conscientiousness and openness to experience by status as defined by average time spent on art per week.**

		Professional	Serious	Hobby
<b>Conscientiousness</b>	Median	39.50	36.00	36.00
	Range	20-50	20-50	23-50
<b>Openness</b>	Median	43.00	43.00	40.00
	Range	28-50	29-50	28-50

The finding of non-significance for agreeableness is also supported in the literature (Dollinger et al., 2004, Furnham & Chamorro-Premuzic, 2004, McCrae, 1987) and so is to be expected. Moreover, the non-significant result for extraversion is also unsurprising since the results from other studies are found to be mixed with artists benefiting from both introverted and extraverted behaviours as mentioned above. Nevertheless, the generally non-significant result for neuroticism would not be what would be hypothesised from previous studies. This therefore may again be a product of the sample prepared to complete this questionnaire. If this is the case then it must be noted that the results of this

study may not be completely generalisable to the whole population of artists particularly with respect to the reproductive success results below since different levels of different personality traits have been found to influence sexual behaviour (Chapter 8).

#### **10.13.1.3. Personality and Public Display**

Furthermore, when the influence of artists' personalities on public display (log) was considered the model was found to be non-significant ( $F_{5,179} = 1.984$ ,  $p = 0.083$ ). This is unexpected since it would be assumed that openness to experience, with its association with artistic ability, and extraversion, which should help the artist to gain contacts and to publicly promote their work, would be influential in increasing public display.

#### **10.13.2. ARTISTS' RATINGS OF THEIR PARTNERS (PARTNER-RATINGS) ON PERSONALITY**

Table 76 demonstrates the distribution of the personality scores for each trait for the partner ratings.



**Table 76. Descriptive statistics for personality traits of artists' partners, as rated by the artists.**

		partner. neuroticism	partner. extraversion	partner. openness	partner. agreeable ness	partner. conscienti ousness
N	Valid	229	230	229	229	229
	Missing	7	6	7	7	7
Mean		26.9345	34.0261	35.5983	36.3843	36.1878
Median		27.0000	34.5000	36.0000	38.0000	37.0000
Std. Deviation		7.70965	8.17009	8.18242	8.15910	8.57089
Skewness		.206	-.403	-.346	-.568	-.633
Std. Error of Skewness		.161	.160	.161	.161	.161
Kurtosis		-.291	-.099	-.496	-.360	-.083
Std. Error of Kurtosis		.320	.320	.320	.320	.320
Range		38.00	40.00	36.00	35.00	38.00
Minimum		11.00	10.00	14.00	15.00	12.00
Maximum		49.00	50.00	50.00	50.00	50.00

Thus, it can be observed that the partners' mean scores for each of the traits are similar to the norms (Table 72), with the means for neuroticism, openness and agreeableness being slightly lower and the means for extraversion and conscientiousness being slightly higher than the norms. Moreover, the means for the partners are similar to those of the artists.

#### **10.13.2.1. Status of artist and partners' personalities**

For self-perceived status there was a significant effect of status on partner-ratings of openness to experience (Tables 77 & 78). Thus, the more professional the artist believed themselves to be the greater the openness scores they attribute to their partners (Table 78) thus if partner-ratings are taken as accurate, as argued in Chapter 9, then this suggests that professional artists, who are higher in

openness, and/or their partners are emphasising openness in their mate preferences. There were no significant effects of artists' self-perceived status on the other personality variables of the artists' partners. Furthermore, for time spent, as a measure of status, there were no significant effects on any of the personality variables.

**Table 77. Effect of self-perceived status on partner-rated personality variables. Test Statistics(a,b)**

	partner. neuroticism	partner. extraversion	partner. openness	partner. agreeable ness	Partner conscienti ousness
Chi-Square	.246	4.224	16.901	2.193	2.249
df	2	2	2	2	2
Asymp. Sig.	.884	.121	.000	.334	.325

a Kruskal Wallis Test  
b Grouping Variable: self-perceived status

**Table 78. Median and ranges for the effect of self-perceived and factor analysed artistic status on openness to experience of artists' partners**

Artistic status	Partner- rated personality variable		Professional	Serious	Hobby
Self- perceived	Openness	Median Range	38.00 14-50	35.00 16-48	32.00 16-50

### 10.13.3. ARTISTS' AND THEIR PARTNERS' PERSONALITIES AND STYLE OF ARTWORK

Since personality has been found to influence preferences for particular styles of artwork it is interesting to explore whether there are personality differences for artists in the predominant style of art that they employ as well as whether there is a relationship between the artistic style of the artist and the personality of their partner.

The terms used by the artists to describe the style of their work overlapped to some extent. Therefore, for this analysis only those who used the terms representational and abstract will be included ( $N = 113$ ) since these two styles are opposing and are commonly used in the literature considering personality and art preferences. Furthermore, these two categories were the most commonly used and so include the greatest number of participants.

Results demonstrated a significant difference between the predominance of use of abstract and representational styles of art on the artists' openness to experience ( $U = 1047.500$ ,  $N_1 = 67$ ,  $N_2 = 46$ ,  $p = 0.004$ , two-tailed) so that those artists using an abstract style were significantly higher on openness to experience (median = 43.00, range = 28-50) than those employing a representational style (median = 40.00, range = 28-49). None of the results for the other traits were significant.

When sex differences were considered it was found that for representational artists there was a significant difference between males and females on extraversion ( $U = 320.500$ ,  $N_1 = 21$ ,  $N_2 = 46$ ,  $p = 0.028$ , two-tailed) with female representational artists being significantly higher in extraversion (median = 33.00, range = 16-49) than male representational artists (median = 27.00, range = 21-40). No other personality traits came to significance for representational artists.

For abstract artists there were found to be no significant differences between males and females on personality traits although neuroticism was close to significance ( $U = 161.500$ ,  $N_1 = 16$ ,  $N_2 = 30$ ,  $p = 0.070$ , two-tailed) and in the

direction of female abstract artists having higher neuroticism scores (median = 32.00, range = 17-45) than male abstract artists (median = 25.50, range = 18-49).

Therefore, there appears to be a relationship between increased openness to experience of the both male and female artists and the production of abstract art. This may be due to more open artists being more attracted to producing art where the boundaries are broken down more thereby possibly stimulating those aspects of openness such as originality, daring and adventurousness. Furthermore, female representational artists appear to be higher on extraversion than male representational artists.

When the relationships between the predominant style of the artist and their partner's personality traits were considered it was found that there was a significant difference between abstract and representational artists on the openness to experience of their partners ( $U = 1007.500$ ,  $N_1 = 67$ ,  $N_2 = 44$ ,  $p = 0.005$ , two-tailed) with abstract artists having partners significantly higher in openness (median = 40.00, range = 17-50) than representational artists (median = 32.00, range = 16-50). None of the effects on the other personality traits came to significance.

When the data was split on sex of the artist's partner it was found that for the male partners there was no significant differences between the two styles on any of their personality traits apart from conscientiousness ( $U = 401.000$ ,  $N_1 = 46$ ,  $N_2 = 29$ ,  $p = 0.004$ , two-tailed) so that male partners of representational artists were higher in conscientiousness (median = 39.000, range = 12-50) than male partners

of abstract artists (median = 33.000, range = 15-47). This result mirrors that from previous research that has found that individuals high in conscientiousness prefer representational art as opposed to abstract art (Furnham & Walker, 2001a).

For the female partners there was a significant difference between those with representational artists and those with abstract artists on their openness to experience ( $U = 41.500$ ,  $N_1 = 20$ ,  $N_2 = 14$ ,  $p < 0.001$ , two-tailed) so that the female partners of abstract artists had significantly higher scores on openness (median = 43.00, range = 35-48) than the female partners of representational artists (median = 36.50, range = 24-47). There were no other significant effects.

Thus, again it is the domain of openness to experience that is associated with abstract art so that higher openness for female partners is associated with abstract art. Previous research has found that those high in openness demonstrate a preference for all types of art (Furnham & Walker, 2001a, Rawlings, 2003). However, only representational art and abstract art have been considered in this analysis and so it appears that females high in openness are more attracted to those artists who produce abstract art and that these artists are likely to be significantly higher in openness than their representational counterparts.

This may have implications for the concept of artworks acting as fitness indicators since abstract art may be an indicator of openness to experience which therefore attracts those individuals who desire this in a mate. There is some suggestion from the results from the fitness indicator study that this may occur (Table 53) but further analysis with a larger number of artworks is required to

understand this in more detail. Moreover, males high in conscientiousness appear to be attracted to female artists producing representational works, which would be beneficial to the female artists should they desire a long-term relationship. However, more detailed exploration of what aspects of the artwork are indicating the artists' qualities are required to qualify these suggestions.

#### **10.13.4. LENGTH OF CURRENT RELATIONSHIP AND PERSONALITY VARIABLES**

There is some evidence to suggest that certain personality variables may be influential in the success of the relationship (Kelly & Conley, 1987, Neyer & Voigt, 2004, Watson et al., 2000b). Therefore, if the assumption is made that length of relationship equates with relationship satisfaction then this can be tested for this sample of artists. Thus, a multiple regression analysis was conducted in an attempt to examine this hypothesis. Length of relationship was the dependent variable and the personality characteristics of the artists' and their partners' as well as age of the artist were the independent variables. The model was found to be significant ( $F_{(11,207)} = 23.266, p > 0.001$ ) and accounted for 53% of the variance ( $R^2 = 0.529$ ). From Table 79 it can be seen that the strongest predictor variable, as expected, is age of the artist. However, even once age is accounted for openness of the artists remains a significant predictor variable of length of relationship with partners openness and conscientiousness nearing significance. What is interesting is that the direction of openness is negative so that the more open to experience the artists are the shorter the length of the relationship. It may be that this finding is due to the possibility that those who

are more open to experience may be more absorbed in and dedicated to their work and thereby spend less time on their relationship thus causing it to break down. However, since increasing levels of openness to experience were found to be associated with increasing artistic status (Tables 74 & 75) then those artists more open to experience are, according to sexual selection, signalling their superior quality and therefore potentially attracting more sexual partners. If this is the case then these artists may adopt a short-term mating strategy. Interestingly, when time spent on artwork is added to this multiple regression, although it makes little difference to the amount of variance accounted for and the model remains significant ( $F_{13,189} = 18,905, p > 0.001$ ) time spent is found to be the second strongest predictor after age of artist ( $\beta = -.167, p = 0.004$ ) and again openness of the artist is still significant ( $\beta = -.121, p = 0.032$ ). Thus, the longer the artist spends on his/her artwork each week the shorter his/her relationship is generally found to be thus supporting the first hypothesis for openness being a negative predictor of relationship length. However, time spent is also a measure of artistic status and if found to effect mating success this then supports the second hypothesis.

**Table 79. Analysis to consider the effects of personality on length of relationship. Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.023	9.824		.308	.759
	Artist.Neuroticism	.047	.085	.031	.557	.578
	artist.extraversion	-.067	.092	-.037	-.726	.469
	<b>artist.openness</b>	-.296	.135	-.119	-2.183	<b>.030</b>
	artist.agreeableness	-.034	.106	-.017	-.316	.752
	artist.conscientiousness	.171	.104	.086	1.642	.102
	partner.neuroticism	.065	.100	.040	.656	.513
	partner.extraversion	-.077	.087	-.048	-.882	.379
	partner.openness	-.167	.090	-.106	-1.856	.065
	partner.agreeableness	.082	.087	.053	.946	.345
	partner.conscientiousness	.155	.079	.104	1.955	.052
	<b>age of artist</b>	.633	.048	.649	13.126	<b>.000</b>

a. Dependent Variable: length of relationship

#### 10.14. REPRODUCTIVE SUCCESS OF VISUAL ARTISTS

This next section will consider the predictions made in the methods chapter of increased artistic status leading to increased mating success, potential fertility, and extra-pair copulations but there being no effect of status on achieved fertility in a contraceptive using society. Moreover differences between the sexes on these variables will be examined. Should the predictions be supported then these will provide strong support for the sexual selection hypothesis of creativity.

Within the entire sample 75% of participants were in a relationship and 24% were not (1% did not respond). Furthermore 45% were married and 51% were not married to their current or most recent partner. A break down by sex of artist can be seen in tables 80 and 81.



**Table 80. Frequency of relationship status for male artists. "married to current/previous partner" \* "In a relationship" Crosstabulation**

			In a relationship		Total
			yes	no	
Married	yes	Count	38	3	41
		% within married	92.7%	7.3%	100.0%
	no	Count	24	15	39
		% within married	61.5%	38.5%	100.0%
	No resp onse	Count	1	4	5
		% within married	20.0%	80.0%	100.0%
Total	Count	63	22	85	
	% within married	74.1%	25.9%	100.0%	

a. sex = male

**Table 81. Frequency of relationship status for female artists. "married to current/most recent partner" \* "In relationship" Crosstabulation**

			In relationship			Total
			yes	no	no response	
married	yes	Count	53	10	1	64
		% within married	82.8%	15.6%	1.6%	100.0%
	no	Count	62	20	0	82
		% within married	75.6%	24.4%	.0%	100.0%
	No resp onse	Count	0	4	1	5
		% within married	.0%	80.0%	20.0%	100.0%
Total	Count	115	34	2	151	
	% within married	76.2%	22.5%	1.3%	100.0%	

a. sex = female

#### **10.14.1. NUMBER OF BIOLOGICAL CHILDREN (ACHIEVED FERTILITY)**

From those who responded to the question on numbers of children there was, as would be expected a skewed distribution (Mean = 1.88, SD = 1.211, Skewness = 0.589, SE of Skewness = 0.216). However, this distribution is limited since only 126 of the 236 participants responded to this question and so it is not possible to know whether those who did not respond did not do so because they did not have children or because they did not wish to respond to the question. Therefore, the analysis of numbers of biological children may not be representative of the whole sample.

A Mann Whitney test demonstrated that there was no significant effect of sex of artist on number of children ( $U = 1628.000$ ,  $N_1 = 50$ ,  $N_2 = 76$ ,  $p = 0.159$ , two-tailed). Furthermore, using the Kruskal-Wallis test there was no significant effect of self perceived status or timespent (a more objective measure of status) on numbers of children ( $\chi^2 = 0.517$ ,  $df = 2$ ,  $p = 0.772$ ) and ( $\chi^2 = 0.833$ ,  $df = 2$ ,  $p = 0.659$ ) respectively. Therefore, there is not a significant difference in terms of numbers of biological children for male and female artists or for those at different levels of artistic status. This later result supports the findings of Nettle & Clegg (in press-b). However, as age is significantly correlated with number of children ( $r = 0.353$ ,  $p > 0.001$ ) because younger people may not have had the opportunity to complete their family, this should have been taken into account in the above analyses. Nevertheless this is not possible using these non-parametric statistics and although parametric statistics could be computed to control for age

it was not felt to be appropriate since the non-parametric  $\chi^2$  statistics above were non-significant.

Since Hopcroft (2004) found that greater intelligence appears to depress achieved fertility then a Kruskal-Wallis test was conducted to identify whether the level of artistic training had an effect on number of biological children. It was found that there was not a significant effect of artistic training on number of children ( $\chi^2 = 8.323$ ,  $df = 4$ ,  $p = 0.080$ ) although it did near significance. However, it should be noted that the level of qualifications only considered those related to art and it may well be that some of the participants were highly qualified in other areas. Furthermore, level of education may not be a good indicator of intelligence. In fact, Hopcroft (2004) used number of words correct on a vocabulary test as a measure of intelligence which makes comparisons with her results difficult. However, she did consider level of qualifications and its relationship with numbers of children but did not equate this with intelligence. She found using this measure that those with the most education have the fewest numbers of children. In an attempt to be able to compare the results from this study with that of Hopcroft's (2004) a multiple regression was conducted with numbers of children as the dependent variable and age of artist, sex of artist, time spent and level of training (Table 82). The model was significant ( $F_{4,102} = 3.670$ ,  $p = 0.008$ ) but accounted for only 9% of the variance (adjusted  $R^2 = 0.92$ ). Only age of the artist was found to be a significant predictor of numbers of children ( $\beta = .312$ ,  $p = 0.001$ ). Thus, the results did not support Hopcroft's findings.

**Table 82. Multiple regression analysis for numbers of biological children. Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-.131	.774		-.170	.866
age of artist	.034	.010	.312	3.321	.001
sex of artist	.307	.247	.122	1.243	.217
timespent	.004	.006	.067	.664	.508
level of training	-.081	.080	-.099	-1.015	.312

a. Dependent Variable: number of biological children

To consider relationships between the personality variables and number of children a parametric correlation analysis was conducted. This found no significant relationships between the personality variables of the artists and their partners and number of children. However, when non-parametric correlations were computed there was a significant negative relationship between artists' openness and number of children ( $\rho = -0.199$ ,  $p = 0.026$ ). Thus, there is some evidence that the more open to experience the artists the fewer children they have. This does not support the sexual selection hypothesis of art although in the Western world number of children is not a good indicator of reproductive success due to the wide use and availability of contraceptives.

Moreover, the correlation between numbers of biological children and numbers of sexual partners were non-significant for both men ( $\rho = 0.170$ ,  $p = 0.253$ ) and women ( $\rho = -0.218$ ,  $p = 0.067$ ) although the results are in the expected direction for men with the suggestion that men have more children with increasing numbers of sexual partners. Whilst numbers of sexual partners should not influence the number of children for women, in this study there is a suggestion

that this actually decreases the number of children for women. This may be because those women who chose this mating strategy do not have as many children since the necessary level of resources to support potential children and themselves are not available to them if they do not have a long term partner (unless their greater number of sexual partners is through affairs).

#### 10.14.2. NUMBER OF SEXUAL PARTNERS (MATING SUCCESS)

The distribution of number of sexual partners for these participants was highly skewed (Table 83).

**Table 83. Distribution of number of sexual partners since the age of 16 years. Statistics(a)**

N	Valid	180
	Missing	2
Mean		10.67
Median		5.50
Std. Deviation		21.746
Skewness		8.267
Std. Error of Skewness		.181
Kurtosis		84.827
Std. Error of Kurtosis		.360
Range		250
Minimum		0
Maximum		250

a. excluding same sex partners

Due to there being a number of outliers the data was converted to a log scale and the following statistics computed using this scale. Since there was no significant relationship between age of artist and number of sexual partners ( $\rho = -0.047$ ,  $p = 0.530$ ) then age was not controlled for in the following analyses. There was found to be a significant effect of sex on number of sexual partners ( $U = 2658.000$ ,  $N_1 = 62$ ,  $N_2 = 116$ ,  $p = 0.004$ , two-tailed) so that male artist (median = 0.9287, range = 0.00-2.40) had significantly more sexual partners than female artists (median = 0.6990, range = 0.00-2.05). However, a consideration of the

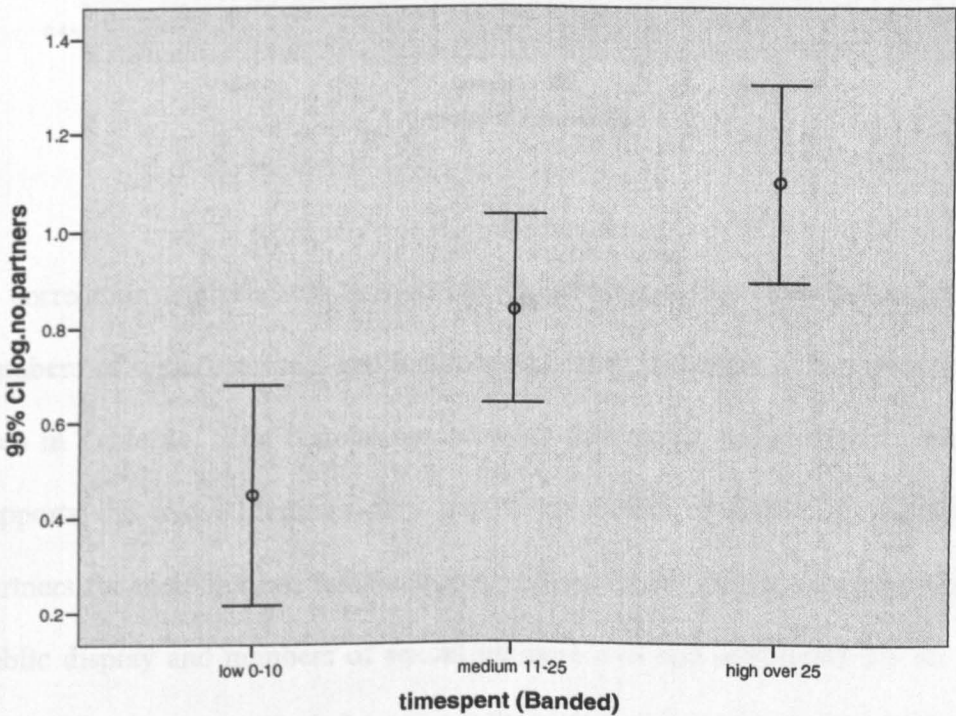
ranges suggests that some female artists are able to attract a large number of mates.

When artistic status was considered there was a significant effect of self-perceived status on number of sexual partners ( $\chi^2 = 11.835$ ,  $df = 2$ ,  $p = 0.003$ ) with number of sexual partners increasing with professional status (professional median = 0.8451, range = 0.00-2.40, serious median = 0.6990, range = 0.00-1.70, hobby median = 0.4771, range = 0.00-2.05 ) and this held when a more objective measure of artistic status (time spent) was used ( $\chi^2 = 9.995$ ,  $df = 2$ ,  $p = 0.007$ ) (large time spent median = 1.000, range = 0.00-2.40, medium median = 0.6990, range = 0.00-1.40, low median = 0.4771, range = 0.00-2.05). Thus the more professional the artists the greater the number of mates they are able to attract. This strongly supports the prediction of sexual selection for mating success and visual art production.

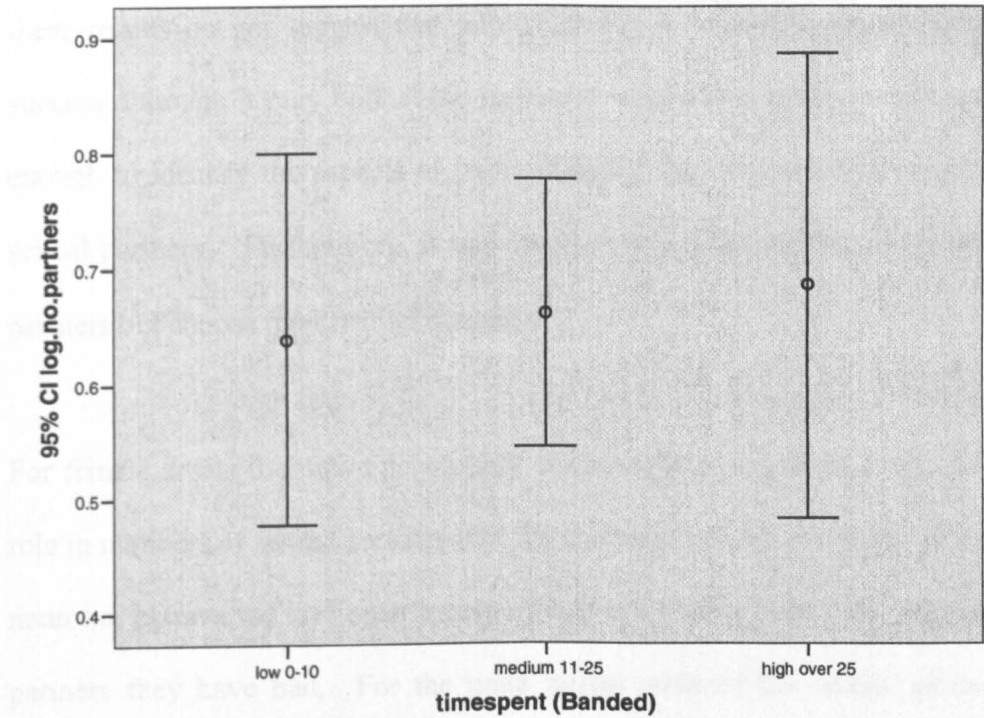
When sex difference in self-perceived artistic status were calculated it was found that there was a significant effect of self-perceived status on numbers of sexual partners for male artists ( $\chi^2 = 12.642$ ,  $df = 2$ ,  $p = 0.002$ ) with more sexual partners the greater the artistic status (professional males median = 1.041, range = 0.00-2.40, serious median = 0.845, range = 0.00-1.40, hobby median = 0.389, range = 0.00-1.08) but not female artists ( $\chi^2 = 1.346$ ,  $df = 2$ ,  $p = 0.510$ ). Moreover, when status was considered using time spent the results supported those for self perceived status with a significant effect of professionalism on number of sexual partners for male artists ( $\chi^2 = 14.558$ ,  $df = 2$ ,  $p = 0.001$ ) with again increasing professional status leading to greater numbers of sexual partners

(large time spent median = 1.1139, range = 0.00-2.40, medium median = 0.8451, range = 0.00-1.40, low median = 0.4771, range = 0.00-1.20) but again this effect was not significant for female artists ( $\chi^2 = 0.163$ ,  $df = 2$ ,  $p = 0.922$ ) (Fig. 18 & 19). Thus, male artists appear to be able to gain greater numbers of sexual partners with increasing artistic status but this is not the case for female artist. Again this provides support for the predictions of the sexual selection hypothesis with regards to sex differences in mating success.

**Fig. 18. Mean Scores (with 95% confidence interval for the mean) on numbers of sexual partners (as a log scale) by timespent (artistic status) for male artists**



**Fig. 19. Mean Scores (with 95% confidence interval for the mean) on numbers of sexual partners (as a log scale) by timespent (artistic status) for female artists**



A correlation analysis was carried out to investigate the relationship between numbers of sexual partners and a number of other variables. The results can be seen in Table 84. The correlations between time spent and number of partners supports the above findings of a significant effect of status on numbers of partners for male but not female artists. Interestingly, the relationship between public display and numbers of sexual partners was non-significant for all three groups. Furthermore, when data was split on artistic status and sex of artist and correlations between public display and numbers of sexual partners were computed all results were found to be non-significant. From sexual selection theory it would have been predicted that this relationship would be significant and positive at least for male artists since males are hypothesised to display more publicly and thereby attract more mates through this behaviour than females



(Miller, 1999, Miller, 2001). Moreover, the results from this study supported Miller's (1999) hypothesis of sexual dimorphism in public display. However, these results do not suggest that public display is related to increased mating success although it may be that the measures within this study are not sensitive enough to identify the aspects of public display that are important in attracting sexual partners. Furthermore, it may be that the artists are able to attract more partners but choose quality over quantity.

For female artists their own personality characteristics appear to play a stronger role in numbers of sexual partners than for the male artists (Table 84). The more neurotic, extraverted and open to experience the female artists the more sexual partners they have had. For the male artists none of the artists' personality variables demonstrated significant correlations with numbers of sexual partners.

Income over the past 12 months was found to be significantly, positively correlated with numbers of sexual partners for male but not female artists (Table 84). Income can be considered an indicator of status (Hopcroft, 2004) and resources. Since it has been consistently found that women desire resources in potential mates more than men (Buss, 1989, Buss et al., 1990, Li et al., 2002) then the finding for male artists' number of partners and income is as would be predicted by evolutionary theory. The non-significant result for female artist would also be anticipated since this is not considered to be a factor that is particularly relevant for male mate preferences.

**Table 84. Spearman's Rho Correlations for number of sexual partners (log scale) and other variables.**

		No. of sexual partners over all sample	No. of sexual partners male Artists	No. of sexual partners female Artists
Time as artist	Correlation coeff. Sig. (2-tailed) N	.046 .539 178	.211 .100 62	-.052 .582 116
Timespent	Correlation coeff. Sig. (2-tailed) N	<b>.308**</b> <b>.000</b> <b>165</b>	<b>.592**</b> <b>.000</b> <b>59</b>	.101 .302 106
Public display	Correlation coeff. Sig. (2-tailed) N	.083 .328 142	.180 .188 55	-.029 .789 87
Artist neuroticism	Correlation coeff. Sig. (2-tailed) N	<b>.176*</b> <b>.019</b> <b>178</b>	.199 .121 62	<b>.282**</b> <b>.002</b> <b>116</b>
Artist extraversion	Correlation coeff. Sig. (2-tailed) N	<b>.186*</b> <b>.013</b> <b>178</b>	.203 .114 62	<b>.185*</b> <b>.046</b> <b>116</b>
Artist openness	Correlation coeff. Sig. (2-tailed) N	<b>.241**</b> <b>.001</b> <b>178</b>	.209 .102 62	<b>.232*</b> <b>.012</b> <b>116</b>
Artist agreeableness	Correlation coeff. Sig. (2-tailed) N	-.104 .168 178	-.166 .197 62	-.074 .428 116
Artist conscientiousness	Correlation coeff. Sig. (2-tailed) N	.074 .329 178	.077 .553 62	.036 .701 116
Partner neuroticism	Correlation coeff. Sig. (2-tailed) N	.078 .305 174	-.131 .317 60	.109 .247 114
Partner extraversion	Correlation coeff. Sig. (2-tailed) N	.130 .086 175	.015 .910 60	.149 .111 115
Partner openness	Correlation coeff. Sig. (2-tailed) N	<b>.217**</b> <b>.004</b> <b>174</b>	<b>.256*</b> <b>.049</b> <b>60</b>	.165 .079 114
Partner agreeableness	Correlation coeff. Sig. (2-tailed) N	-.016 .835 174	.089 .497 60	-.065 .490 114
Partner conscientiousness	Correlation coeff. Sig. (2-tailed) N	-.052 .497 174	.033 .803 60	-.089 .349 114
Age of artist	Correlation coeff. Sig. (2-tailed) N	-.047 .530 178	.085 .512 62	-.113 .227 116
Annual income of artist	Correlation coeff. Sig. (2-tailed) N	<b>.239**</b> <b>.002</b> <b>162</b>	<b>.329*</b> <b>.012</b> <b>57</b>	.172 .079 105
Length of relationship	Correlation coeff. Sig. (2-tailed) N	<b>-.269**</b> <b>.000</b> <b>171</b>	-.078 .555 60	<b>-.366**</b> <b>.000</b> <b>111</b>

\*\* . Correlation is significant at the 0.01 level (2-tailed)

\* . Correlation is significant at the 0.05 level (2-tailed)

There was a significant negative relationship between length of relationship with current partner and numbers of sexual partners for female artists. Thus the longer the relationship the fewer sexual partners a female artist is likely to have. This is unsurprising and suggests that female artists are not engaging in extra-pair copulations. The relationship between number of sexual partners and length of relationship with current partner was found to be non-significant for male artists. Again sexual selection theory would explain this by the stating that the sex that invest less in offspring (usually males) are more inclined to short term matings and so length of relationship may not be relevant particularly if males are engaging in infidelity. This explanation assumes that the length of the current or previous relationship is a reflection of the usual length of relationship engaged in.

To consider the combined effects of the above variables on numbers of sexual partners a multiple regression analysis was performed since a consideration of the data indicated that it was robust enough for such a procedure. Since it appears from the correlations that the numbers of sexual partners gained by male and female artists may be influenced by different variables then separate multiple regressions were conducted for the two sexes (Tables 85 & 86).

For male artists the model was significant ( $F_{15,37} = 5.613$ ,  $p < 0.001$ ) and accounted for 57% of the variance (adjusted  $R^2 = 0.571$ ). Time spent was the strongest significant predictor variable ( $\beta = 0.533$ ,  $p < 0.001$ ). Since this variable is considered to be a more objective measure of artistic status this confirms the relationship between artistic status and numbers of sexual partners for male

artists even once income has been taken into consideration. Since greater artistic status leads to increased numbers of sexual partners for male artists then this provides support for the sexual selection hypothesis of visual art.

Furthermore, income was also a significant predictor variable of numbers of sexual partners as would be expected due to the significant preference of women for resources found in mate preference studies. Interestingly, the male artists' levels of neuroticism were also a significant predictor variable in a positive direction so the higher the artists' neuroticism levels the greater their number of sexual partners. Moreover the artists' conscientiousness scores were also a significant predictor with more conscientious male artists gaining a greater number of sexual partners. From a review of the literature on sexual behaviours and personality neither of these relationships would be anticipated. However, male artists' extraversion and agreeableness come near to significance and are in the predicted direction of greater extraversion and low agreeableness leading to a larger number of sexual partners.

**Table 85. Multiple regression analysis to consider the effects of artistic personality and relationship variables on numbers of sexual partners for male artists. Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1	(Constant)	-2.166	1.399		
	time as artist	.003	.006	.075	.539
	timespent	.013	.003	.533	.4205
	Artist.Neuroticism	.021	.009	.344	2.353
	artist.extraversion	.016	.008	.220	1.972
	artist.openess	.020	.014	.180	1.422
	artist.agreeableness	-.020	.010	-.259	-1.932
	artist.conscientiousness	.023	.011	.290	2.189
	partner.neuroticism	.002	.011	.024	.154
	partner.extraversion	.004	.011	.046	.339
	partner.openness	-.020	.010	-.285	-2.012
	partner.agreeableness	.018	.011	.233	1.559
	partner.conscientiousness	.013	.008	.209	1.773
	age	8.23E-005	.008	.002	.010
	Income	1.29E-005	.000	.312	2.593
	length of most recent relationship	-.006	.007	-.150	-.909

a. Dependent Variable: number of sexual partners (log scale)

b. sex = male

For the female artist the model was also significance ( $F_{15,76} = 2.615$ ,  $p = 0.003$ ) and accounted for 21% of the variance (adjusted  $R^2 = 0.210$ ). Length of most recent relationship is the strongest predictor variable and this is in a negative direction (Table 86). Thus, the shorter the length of the current relationship the greater the number of sexual partners for the female artists. The female artists' neuroticism scores are the second strongest predictor and again, as for the male artists, are in a positive direction. This consistent result for both sexes, since not predicted by the literature, may be a product of the sample. Age is also a significant positive predictor for the female artists. Interestingly both artists' extraversion and income come near to significance. This finding for income is surprising since this is a factor that is usually not found to be relevant in male

mate preferences. However, men have been found in more recent years to be increasing the value they place on resources in women (Buss et al., 2001). Furthermore, it may be that women with higher incomes are able to live independently and so may not marry and therefore can have a greater number of sexual partners without being unfaithful.

**Table 86. Multiple regression for the effects of personality and relationship variables on numbers of sexual partners for female artists. Coefficients**<sup>a, b</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-.037	.738		-.051	.960
time as artist	.003	.004	.099	.939	.351
timespent	.002	.003	.082	.819	.415
<b>Artist.Neuroticism</b>	.019	.006	.337	3.044	<b>.003</b>
artist.extraversion	.011	.006	.191	1.772	.080
artist.openess	-.005	.010	-.063	-.548	.585
artist.agreeableness	-.007	.008	-.098	-.893	.375
artist.conscientiousness	.001	.007	.019	.176	.861
partner.neuroticism	.000	.008	.003	.020	.984
partner.extraversion	.005	.006	.091	.822	.414
partner.openness	.001	.006	.022	.185	.854
partner.agreeableness	-.001	.006	-.027	-.202	.840
partner.conscientiousness	-.001	.006	-.025	-.222	.825
<b>age</b>	.010	.005	.307	2.111	<b>.038</b>
income	5.05E-006	.000	.176	1.761	.082
<b>length of most recent relationship</b>	-.019	.005	-.530	-3.677	<b>.000</b>

a. Dependent Variable: number of sexual partners (log scale)

b. sex = female

Thus, it appears that on the whole these results support the sexual selection hypothesis of visual art since male artists were found to have significantly more sexual partners the higher they were in artistic status but that these results were not found for the female artists. There was also found to be some effect of

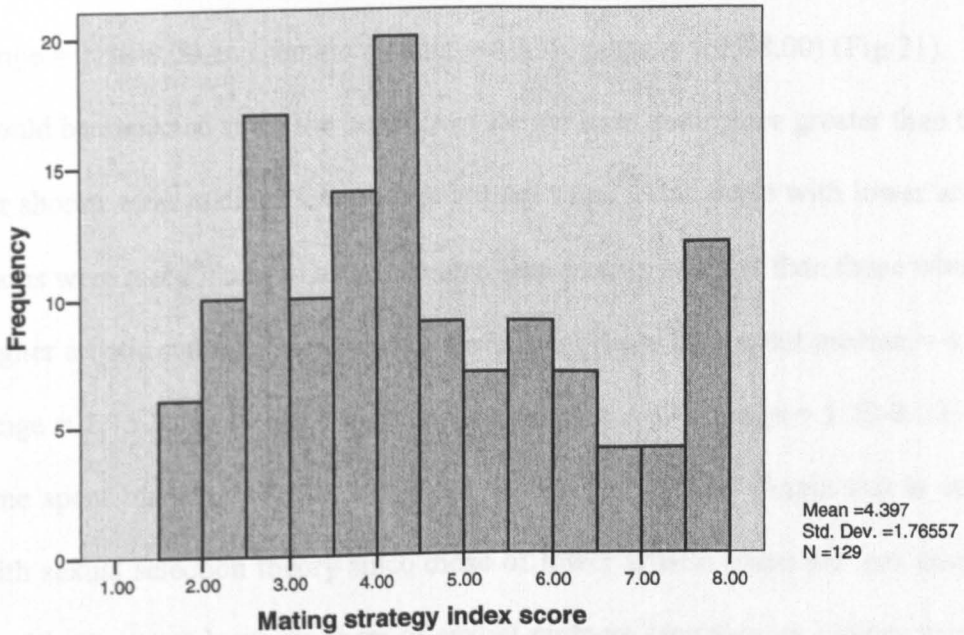
personality on mating success although the results were not in the direction predicted by previous research.

### **10.14.3. MATING STRATEGY**

This section considers whether there are relationships between artistic status, personality and the mating strategies employed (short or long term).

To consider the overall mating strategy of an artist a mating strategy index was computed by assigning points to each length of relationship so that for each one night stand the individual gained 1 point, for each relationship up to a month they gained two points, and so on until for each relationship ten years or over they gained 8 points. When this had been calculated their total number of points was added up and divided by the artist's total number of relationships. Thus, the lower their score the more short-term their mating strategy. The distribution of the mating strategy index scores can be seen in Fig 20.

**Fig. 20. Distribution of the frequency of mating strategy index scores for all artists**



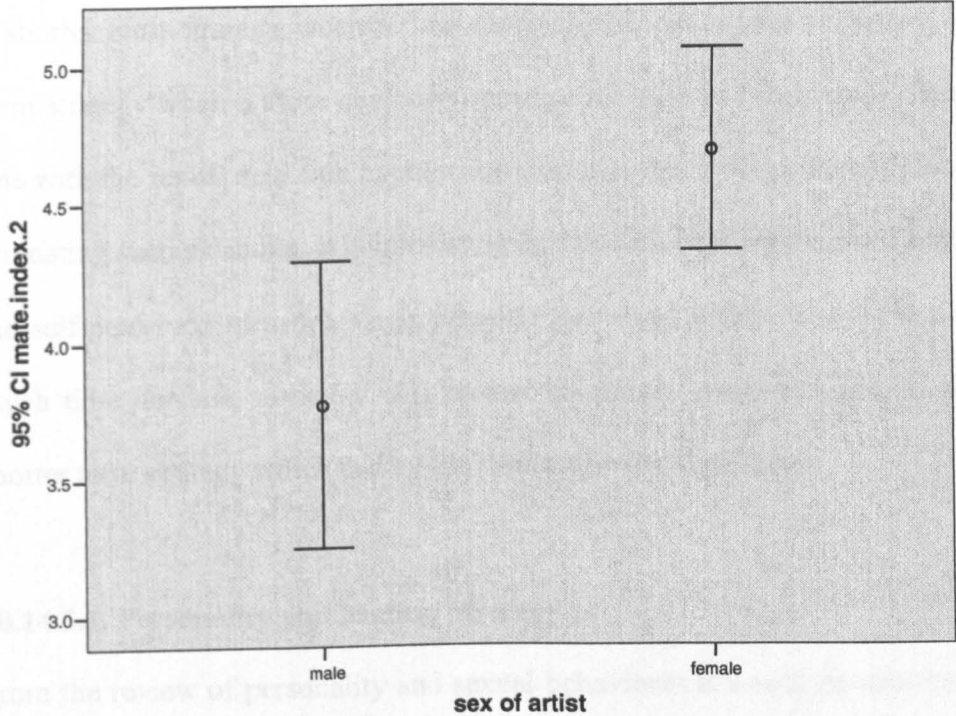
Since age was significantly correlated with this index ( $p = 0.299$ ,  $p = 0.009$ ) then age needed to be controlled for in the following analyses. Thus, a two-way between-subjects ANCOVA was conducted with age as a covariate. The main effect of sex of artist ( $F_{(1,122)} = 3.540$ ,  $p = 0.062$ ) and the main effect of self-perceived status ( $F_{(2,122)} = 2.240$ ,  $p = 0.111$ ) was non-significant as was the interaction between sex and self-perceived status ( $F_{(2,122)} = 0.657$ ,  $p = 0.520$ ). Thus, self-perceived status and sex had no effect on mating strategy employed.

When time spent as a measure of status was considered using a two-way between subjects ANCOVA, with age as the covariate, there was a significant main effect of sex ( $F_{(1,113)} = 5.777$ ,  $p = 0.018$ ) and a significant main effect of status ( $F_{(2,113)} = 4.949$ ,  $p = 0.009$ ) but the interaction between sex and status was non-significant ( $F_{(2,113)} = 1.185$ ,  $p = 0.390$ ). Thus, once age was held constant 21% of the

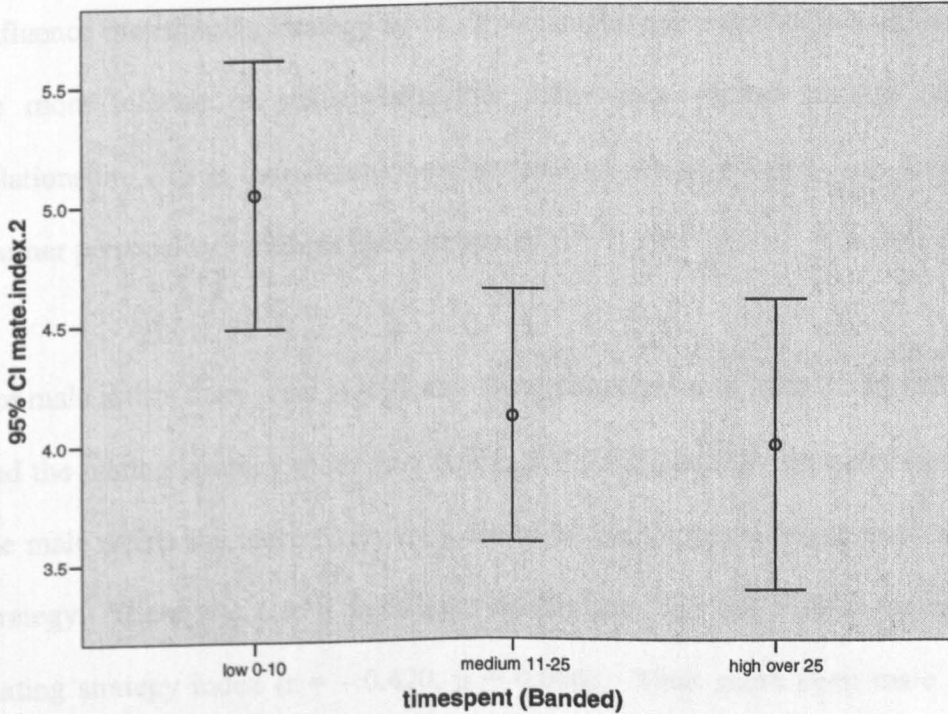


variation in mating strategy index scores can be accounted for by time spent (artistic status) and sex of the artist. Thus females were significantly more likely to use a longer term mating strategy than male artists (male median = 3.550, range = 1.58-8.00 and female median = 4.375, range = 1.93-8.00) (Fig 21). This would be expected since the benefits of longer term mating are greater than those for shorter term matings for women but not men. Also those with lower artistic status were more likely to have a longer term mating strategy than those who had higher artistic status as measured by time spent (Low time spent median = 4.800, range = 1.75-8.00, medium time spent median = 3.857, range = 1.58-8.00, high time spent median = 3.550, range = 1.60-8.00) (Fig. 22). Again this is in line with sexual selection theory since those of lower artistic status are less likely to be able to attract large numbers of sexual partners (see data on mating success) and so may go for a longer term strategy. Interestingly, there is no significant relationship between income and mating strategy index ( $\rho = -0.027$ ,  $p = 0.766$ ) thus suggesting that income does not effect the type of mating strategy employed.

**Fig. 21. Mean Scores (with 95% confidence interval for the mean) on mating strategy index scores for male and female artists**



**Fig. 22. Mean scores (with 95% confidence interval for the mean) on mating strategy index scores by time spent**



Therefore, it appears that male artists tend to employ a short term mating strategy and females a longer term strategy. Moreover, more professional artists employ a shorter term strategy whereas less professional artists tend to have a longer term strategy when a more objective measure of status is considered. This is in line with the sexual selection hypothesis of art and the findings already discussed on mating success above. It is interesting that the effect of status is not found for the self-perceived measure. It is possible that some artists who do not spend much time on their work but still project an artistic image are able to have a shorter term strategy which is why the results are non-significant.

#### **10.14.3.1. Personality and Mating Strategy**

From the review of personality and sexual behaviours it would be expected that the artist's personality may influence the mating strategy they choose to employ. Furthermore, if it is assumed that the participants are attracted to similar personality types in their partners then their partner's personality traits may also influence their mating strategy since, for example, more agreeable partners may be more tolerant of sexual behaviour from their partner outside of their relationship. Thus correlations between mating strategy index, and artist and partner personality variables were computed.

For male artists there were significant correlations between artist's agreeableness and the mating strategy index ( $r = 0.361$ ,  $p = 0.021$ ) so that the more agreeable the male artists the more likely they are to be employing a longer term mating strategy. There was also a significant relationship between male openness and mating strategy index ( $r = -0.420$ ,  $p = 0.006$ ). Thus, more open male artists

engaged in shorter term mating strategies. However, when age was partialled out it was found that only the relationship with openness remained significant ( $r = -0.405, p = 0.011$ ).

For female artists neuroticism was the only personality variable significantly correlated with the mating strategy index, ( $r = -0.292, p = 0.006$ ). Thus more neurotic female artists employed shorter mating strategies. This finding held when age was partialled out ( $r = -0.299, p = 0.005$ ).

When a regression analysis was performed separately for the male and female artists using mating strategy index as the dependent variables and those variables that had significant partial correlations with the dependent variable (artists' openness and neuroticism) as well as age, time spent (as a measure of status) and public display, which would be predicted to effect mating strategy, it was found that for the males there was a significant model ( $F_{5,30} = 3.604, p = 0.011$ ) that accounted for 27% of the variance (adjusted  $R^2 = 0.271$ ). Openness of the artist was the strongest significant predictor of mating strategy ( $\beta = -.384, p = 0.026$ ). Thus high openness significantly indicates predominance in using a short-term mating strategy for male artists. This may be due to the artist being able to attract more partners due to the positive association between openness and artistic status and thereby leading to a short-term mating strategy. Moreover age was also found to be a significant predictor ( $\beta = .335, p = 0.042$ ) so that the older the artist the more they employed a long term mating pattern.

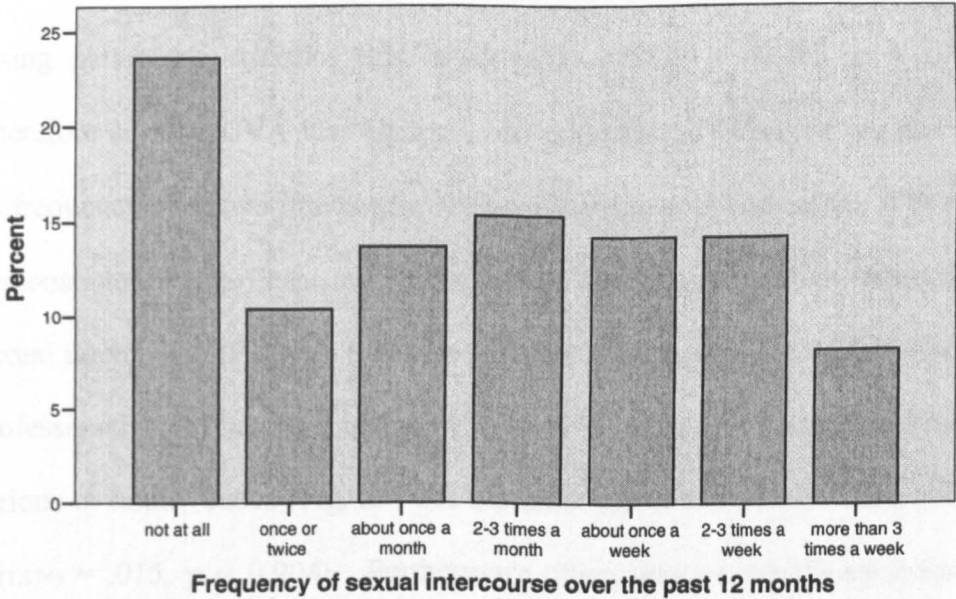
For the female artists the model was significant ( $F_{5,53} = 4.817, p < 0.001$ ) and accounted for 25% of the variance in mating strategy index scores (adjusted  $R^2 = 0.248$ ). Age was the strongest significant predictor ( $\beta = .416, p = 0.001$ ) with artists' neuroticism also being a significant predictor ( $\beta = -.360, p = 0.003$ ). Thus, the higher the female artists are in neuroticism the more they are likely to employ a short term mating strategy. This may be due to the relationship breaking down more quickly due to the effect that higher levels of neuroticism may have on the dynamics of the relationship as well as its association with decreased sexual satisfaction in women (Heaven et al., 2000).

Thus it appears that personality does to some extent have an effect on the mating strategy but the findings do not necessarily reflect the literature on personalities and sexual behaviours since those traits most closely associated with promiscuity and infidelity such as low agreeableness and conscientiousness and high extraversion were not found to predict mating strategy. This may be due to an artistic culture mediating the effects of personality and mating strategy or to do with a bias in the sample. Furthermore, as for mating success, public display does not predict mating strategy, this may be due to the measures in the questionnaire not identifying the aspects of public display that would indicate mating strategy.

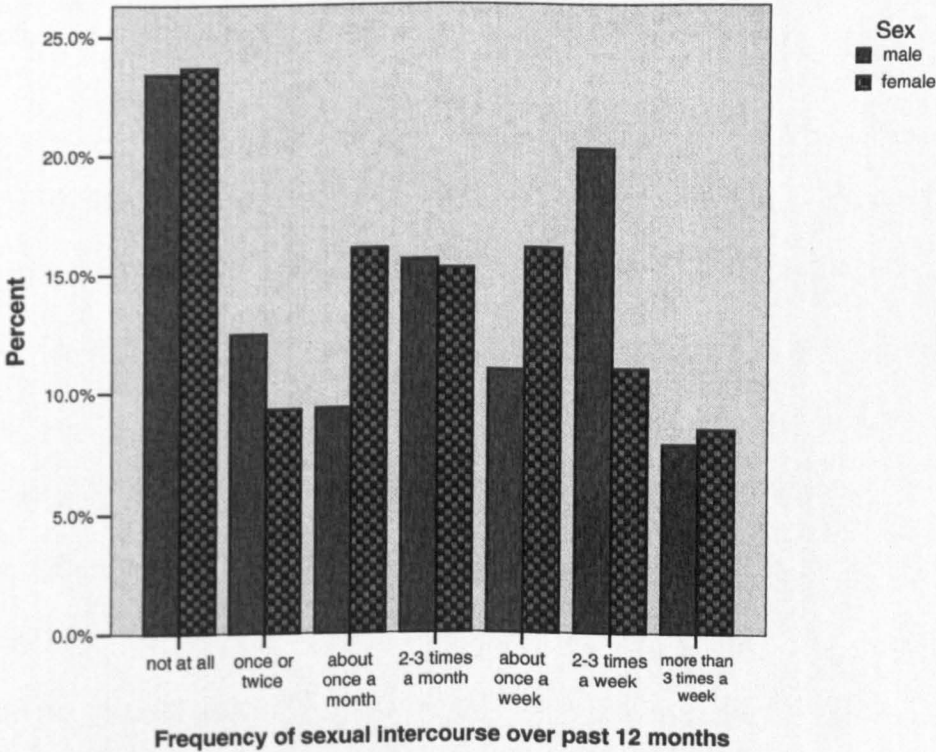
#### **10.14.4. FREQUENCY OF SEXUAL INTERCOURSE (POTENTIAL FERTILITY)**

The frequency of sexual intercourse in the last 12 months for the whole sample and for males and females separately can be seen in figures 23 and 24.

**Fig. 23. Distribution of frequency of sexual intercourse in the past 12 months for all artists**

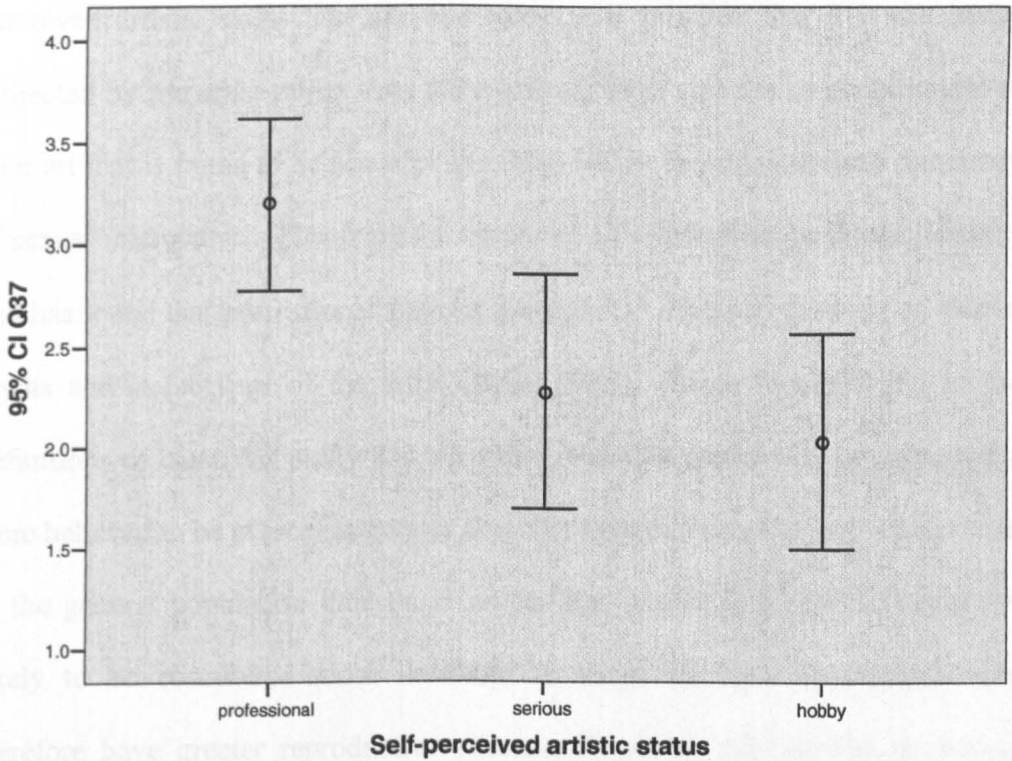


**Fig. 24. Frequency of sexual intercourse over the past 12 months for male and female artists**



The scores for frequency of sexual intercourse were treated as continuous variables for the purpose of analysis. There was a significant negative relationship between frequency of sex and age of artist ( $\rho = -0.265$ ,  $p < 0.001$ ) (using parametric statistics this relationship held ( $r = -0.280$ ,  $p < 0.001$ )). Therefore an ANCOVA was computed to consider the effects of sex and status on frequency of sexual intercourse whilst using age as the covariate. The results demonstrated a significant main effect of self-perceived status on frequency of sexual intercourse ( $F_{(2,174)} = 6.111$ ,  $p = 0.003$ ) with those artist of self-perceived professional status having a greater frequency of sexual intercourse than those of serious or hobby status (Fig. 25) but the main effect of sex was non-significant ( $F_{(1,174)} = .015$ ,  $p = 0.904$ ). Furthermore, there was no significant interaction between sex and status ( $F_{(2,174)} = .207$ ,  $p = 0.813$ ). This model accounted for 13% of the variance (adjusted  $R^2 = 0.126$ ).

**Fig. 25. Mean scores (with 95% confidence interval for the mean) on frequency of sexual intercourse by self-perceived artistic status**



Note: for frequency of sexual intercourse over past 12 months 0 = not at all, 1 = once or twice, 2 = about once a month, 3 = 2-3 times a month, 4 = about once a week, 5 = 2-3 times a week and 6 = more than 3 times a week.

Interestingly, when time spent was used as a measure of objective status, and age of the artist was the covariate, the main effects of sex and status were non-significant ( $F(1,160) = .937, p = 0.334$ ) and ( $F(2,160) = .212, p = 0.809$ ) respectively nor was the interaction between sex and status ( $F(2,160) = .309, p = 0.735$ ). Therefore, it appears that the artists' subjective measure of their artistic status does affect frequency of sexual intercourse, and thereby potential fertility, so that those believing that they are more professional have more intercourse on average whereas the more objective measure of status did not have this effect. Initially this may appear to support the sexual selection hypothesis since for at least one



measure of status the more professional the artist the greater their potential fertility, if professionalism equates with quality of art. However, since it is self-perceived artistic status that has this effect it is possible that it is the image projected by the artist rather than the reality of their abilities or commitment to their art that is found to be sexually attractive which thereby increases frequency of sexual intercourse. This is partly supported by work done on artistic identity that has found that professional status is projected to others by drawing on shared myths and stereotypes of the artist (Bain, 2005). Since it was found in the definitions of creativity study that the more desirable personality characteristics were believed to be present in greater amounts in highly creative individuals than in the general population then those artists that project high artistic status are likely to be considered more desirable in terms of their personalities and therefore have greater reproductive success. However, this increase in sexual intercourse does not appear to be due to an increase in numbers of sexual partners since the correlation between the two was non-significant ( $r = -0.016$ ,  $p = 0.830$ ) (the non-parametric correlation was also non-significant ( $\rho = 0.090$ ,  $p = 0.229$ )). Thus, the self-perceived professional artists must be found to be more desirable within their relationship therefore increasing their average frequency of intercourse.

Furthermore, there was a non-significant relationship between income and frequency of sexual intercourse ( $r = 0.027$ ,  $p = 0.730$ ) (and this held for the non-parametric correlations ( $\rho = 0.050$ ,  $p = 0.521$ )). Thus, an individual's status, as defined by their income, does not appear to have an influence on the frequency of sexual intercourse. This is surprising since this is a consistently desired

characteristic, at least for females, and so would be expected to have an affect on potential fertility (the separate correlations for male and female artists were also non-significant). However, resources, such as income, are desired to allow the offspring and the mother to survive so that the offspring can go on to reproduce whereas creativity is desired due to its apparent link with “good genes”. Thus, if “good genes” are desired then individuals will want to increase their frequency of sex to increase conception chances and therefore have offspring with good genes. However, resources are available to offspring regardless of frequency of sexual intercourse and do not genetically benefit the offspring which may be why the two are not significantly related.

From the view point of sexual selection it is not surprising that there is not an effect of sex of artist on frequency of intercourse, especially if this is not due to an increase in numbers of sexual partners, since it is likely to increase reproductive success for both men and women particularly as the greater the frequency of sexual intercourse the increased likelihood of co-ordinating sex with ovulation and thereby increasing the chances of conception (Hopcroft, 2004).

#### **10.14.4.1 Personality and frequency of sexual intercourse**

When correlations were computed between frequency of sexual intercourse and personality variables of the artists and their partners, it was found for male artists that the only significant correlations were for partner openness ( $r = 0.356$ ,  $p = 0.005$ ) and partner conscientiousness ( $r = 0.252$ ,  $p = 0.048$ ) and that these

correlations held once age was partialled out (partner openness ( $r = 0.346$ ,  $p = 0.006$ ) and partner conscientiousness ( $r = 0.266$ ,  $p = 0.038$ )). Thus male artists with more open and conscientious partners have greater frequency of sexual intercourse. When correlations were computed for female artists only partner openness was found to be significant ( $r = 0.235$ ,  $p = 0.011$ ). When age was partialled out there were no significant correlations for female artists between personality variables and frequency of sex. Moreover, when multiple regression analysis was conducted with frequency of sexual intercourse as the dependent variable and age, public display, income, partner openness and partner conscientiousness as the independent variables the model for the male artists did not come to significance ( $F_{5,43} = 1.840$ ,  $p = 0.125$ ). The model for the female artist did come to significance ( $F_{5,71} = 4.842$ ,  $p = 0.001$ ) and accounted for 20% of the variance (adjusted  $R^2 = 0.202$ ). However, the only significant predictor variable was age ( $\beta = -.425$ ,  $p < 0.001$ ). Thus, it appears that personality has little effect on potential fertility for this sample.

#### **10.14.6. EXTRA-MARITAL AFFAIRS (EXTRA-PAIR COPULATIONS)**

From the entire heterosexual sample 20 participants (8.5%) stated that they had had an affair over the past 12 months, 206 (87.3%) claimed that they had not had an affair and 10(4.2%) did not respond. The effect of sex on engagement in an affair was non-significant ( $\chi^2 = .375$ ,  $df = 1$ ,  $p = 0.540$ ).

Whilst chi-squared could not be performed for self-perceived status, since there was 1 cell with an expected count of less than 5, it was possible to do it using time spent as a more objective measure of status. The relationship between time

spent and having had an affair was non-significant ( $\chi^2 = 2.220$ ,  $df = 2$ ,  $p = 0.330$ ). Thus, artistic status does not have a significant relationship with whether the artist has had an affair over the past 12 months. This does not support Miller's (2001) prediction that individuals, particularly males, who produce better quality art (and therefore should have higher artistic status) should have a greater number of extra-pair copulations compared to those of lower artistic status due to increased sexual attractiveness.

To identify whether those artists who had affairs differed in personality to those who did not a Mann-Whitney test was conducted. There was a significant difference between those who had affairs and those who did not in extraversion ( $U = 1282.000$ ,  $N_1 = 20$ ,  $N_2 = 206$ ,  $p = 0.005$ , two-tailed) with those who had affairs having a significantly higher extraversion score than those who did not (median = 38.000, range = 23-45) and (median = 33.000, range = 15-49) respectively. However, there was no significant difference for any of the other personality traits of the artists. The results for extraversion are unsurprising since previous research has found increased extraversion to be associated with significantly greater infidelity (Nettle, 2005, Schmitt, 2004).

## **10.15. CONCLUSION**

From the analysis of the data two measures of artistic status arose; the subjective measure of self-perceived status and the more objective measure of time spent on art. This allowed for consideration of differences in reproductive success and personality for the image that the artist projects and has developed through their

self-perceived artistic status with the actual importance they attribute and effort they devote to being an artist.

The personality characteristics of the artists equated closely to the norms from a more general population. This is somewhat surprising considering previous research on artists' personalities and may be due to the sample used to provide the norms. However it may also be due to biases in the personalities of those who are prepared to answer online questionnaires of an intimate nature although the anonymity of the questionnaire should have reduced this bias to some extent. Nevertheless the following conclusions on personality should be interpreted cautiously when generalising to the entire population of artists.

There were no significant sex differences in the personality traits of the artists. As there was a move from self-perceived hobby to professional artists there was found to be an increase in extraversion, openness and conscientiousness and this held for the more objective measure of status, time spent, for conscientiousness and openness. Since openness is strongly associated with artistic ability this relationship is unsurprising as it would be expected that the more professional the artist the more open they are. Furthermore, high conscientiousness would ensure that an artist produced enough work and put in the effort required to have the work recognised. High extraversion can also be beneficial in the promotion of the artwork.

Interestingly, there were found to be some relationships between the style the artist predominantly employed and the personality characteristics of the artist and

their partner. More specifically, females high in openness were more attracted to artists who produce abstract art and those who produced abstract art were found to be significantly higher in openness than those who produced representational art. Furthermore, males high in conscientiousness were more attracted to female representational artists. This is an extension to studies that consider the relationship between art preferences and personality characteristics. Moreover, if individuals with certain levels of personality traits are attracted to particular styles of art then this has implications for the fitness indicator theory of art since the style of the art may be one indicator of an artist's personality. Whilst the results from the fitness indicator study suggest that there may be evidence for this, further exploration is required.

Due to conflicting results from the current literature on personality and sexual behaviours it was not possible to formulate hypotheses regarding personality and reproductive success. In fact, from the above results it appears that personality variables, as defined by the five factor model, had little direct effect on achieved fertility, potential fertility, and numbers of extra-pair copulations. However, neuroticism of the artist significantly predicted mating success for male and female artists and conscientiousness predicted mating success for males only. Moreover, openness significantly predicted male mating strategy and neuroticism significantly predicted female mating strategy. These results do not necessarily reflect the literature on personality and mating success and may be either mediated by the artistic culture or be evidence of a bias within the sample.

The predictions derived from Miller (1999) regarding public display that “male artists should have a greater number of exhibitions and/or the length of the exhibitions will be longer than for female artists” were only partially supported. Male artists were found to exhibit for longer than female artists but there was no significant difference for the number of exhibitions the two sexes exhibited at. Furthermore, when the variable public display was computed there was found to be a significant difference between the sexes so that male artists displayed more than female artists. Moreover, when professional artists were considered separately, as Miller (1999) had previously done, there was found to be a significant effect of sex, so again males displayed more than females, but not for age on public display. Furthermore the correlation between public display and number of sexual partners was found to be non-significant for both males and females which is the not what would be anticipated according to sexual selection theory although it is possible that greater public display does lead to an increase in mating opportunities but that the artists are choosing higher quality mates and not greater numbers. Unfortunately quality of mate is an extremely difficult concept to assess in such a study and so this hypothesis is not able to be tested.

The prediction that increased mating success, as measured by numbers of sexual partners over one’s lifetime, is associated with an increase in artistic status and that this will be found for males but not females was supported, which substantiates Miller’s (2001) claims. However, the non-significant finding for female artists may not mean that professional female artists are not attracting more sexual partners but rather that they are seeking quality over quantity although this can not be confirmed or refuted from the data available in this

study. Furthermore, although income was found to be significantly correlated with mating success, once this was controlled for, time spent on art, as a measure of artistic status, remained a significant predictor of numbers of sexual partners for male artists. Thus, although status in terms of resources is often considered to over ride the effect of creativity for mating success this was not found to be the case.

When mating strategy was considered it was found that female artists engaged in significantly more longer term strategies than male artists. This is unsurprising since the costs of short term strategies for females are much greater than for males where the benefits of increased reproductive success generally outweigh the costs. Moreover, time spent, as a measure of artistic status, was found to have a significant effect on mating strategies so that those who had lower status were significantly more likely to employ a longer term strategy. This again supports the sexual selection hypothesis of visual art.

For achieved fertility there was found to be no significant effect of sex of artist or artistic status on numbers of biological children. This confirms the hypothesis that "...achieved fertility will not be correlated with artistic status" and supports the findings of Nettle & Clegg (in press-b). Such findings are probably the results of widely available contraceptives in Western society.

The hypotheses that those artists who have higher artistic status will have greater potential fertility than those of lower status were supported for self-perceived status but not for a more objective measure of artistic status. However, this was



not due to an increase in the numbers of sexual partners. Furthermore, there was not a significant difference in frequency of sexual intercourse between the sexes. Whilst a sex difference may initially be predicted if it is assumed that an increase in intercourse is associated with an increase in the number of partners, since this is not the case a sex difference should not be anticipated as increased sexual intercourse will benefit the achieved fertility of women as well as men. Thus, it was suggested that it may be the image of a professional artist that makes the artist more attractive, which may be based on commonly held stereotypes, and that this image remains attractive within a relationship leading to increased frequency of sexual intercourse.

When numbers of extra-pair copulations were considered there was found to be no significant effect of sex of artist or status. This argues against the prediction that “professional artists...will have a greater number of extra-pair copulations compared to less professional artists”. Nevertheless, the numbers of artists claiming to have had affairs was small and so may have weakened the statistical power of the analysis. To explore this hypothesis further requires a much greater number of artists to allow for enough artists who have had affairs to participate. This was not possible in this study due to time restrictions.

Thus, it appears that overall the data from this study supports the sexual selection hypothesis of creativity. However, these results can only be generalised to heterosexual white Western artists. Future studies could consider the results from different cultures and for homosexual and bisexual artists.

## **11. CONCLUSION**

The conclusion to this thesis will first consider the implications of the results from the three studies for the sexual selection hypothesis of creativity, and in particular visual art. It will then explore the significance of these findings for the broader field of the psychology of creativity. This will then lead into a discussion on the opportunities for future research which have arisen from the studies presented in this thesis.

### **11.1. THE SEXUAL SELECTION HYPOTHESIS OF CREATIVITY**

Despite frequent claims in the evolutionary literature, there is little empirical evidence that creative behaviour emerged due to sexual selection pressures. Such a situation leaves evolutionary psychology open to criticism, in particular that the discipline lacks rigour and consists of “just so stories”. Therefore, the primary aim of this thesis was to begin to empirically explore the sexual selection hypothesis of creativity.

Definitions of creativity are broad and often incorporate such diverse activities that one overarching evolutionary explanation for their emergence implies that each creative behaviour serves the same function. Such an assumption cannot be justified without considerable evidence that this is the case and so it is more appropriate to examine individual creative activities. The focus on this thesis has been on art. The first study justified this choice by demonstrating that creativity is inextricably linked with The Arts and artists in people’s minds.

From study two there is evidence that artworks act as fitness indicators. However, the results indicate a more complex picture than has previously been suggested. It does not appear to be a simple relationship between higher qualities of the artist, such as higher creative ability and greater intelligence, leading to increased mating success, but rather that individual mating preferences play a significant role with greater emphasis on personality traits than is suggested by Miller (2001).

The fact that, apart from intelligence, the raters were unable to be statistically significantly accurate but appear to be able to judge broad levels of the artists' characteristics and make mate choice decisions based on these suggests several possibilities. One suggestion is that the raters do not seek the highest quality mates due to trade offs, their own mate value or the disadvantages that may be associated with the highest level of particular qualities.

Nevertheless, it may be that currently observers of art are still developing their ability to use artworks as fitness indicators due to the relatively late emergence of art in the archaeological record. In fact, it is possible that the use of artworks as fitness indicators is a very modern phenomenon and that art has only recently, within the last few hundred years been co-opted by sexual selection. This supposition is supported in part by a consideration of the status and function of artists not only in other societies but also earlier in Western history. The fact that artists have not always been able to express their creativity due to the boundaries placed on their work by various authorities and that their status has fluctuated during history implies that artists may not always have been considered desirable

and therefore artworks would not have been used as fitness indicators. However, in today's western society artists are awarded much higher status and have therefore become much more desirable as potential sexual partners. If art has been co-opted by sexual selection then this does not explain its emergence and other evolutionary hypotheses must be explored. To attempt to identify whether this is the case then studies testing the sexual selection hypothesis of visual art are required in other cultures, particularly in those where the status of artists is different to that in the West.

Moreover, the fitness indicator study does not indicate whether in reality art is actually used as a fitness indicator. While the third study on artists' personalities and sexual behaviours suggests that more successful artists are more sexually attractive, and this could be used to support art acting as a fitness indicator, in fact it is possible that it is other aspects of the artist that are attracting sexual partners. One theory is that it is the fact that an individual actually makes art that is attractive rather than the qualities displayed through the art, and that such behaviour evokes a stereotyped image of an artist that is attractive and therefore desirable. This is partly supported by the findings in the first study where a highly creative individual's personality was considered to be more attractive than has previously been described in the psychological literature. Thus, when specifically requested to consider the artists' traits from their artworks, while individuals are able to do this to some extent they may not do this routinely in reality. If this is the case then the fact that the raters in the fitness indicator study were partly accurate in their assessments of the artists' traits may be due to them using their abilities to assess personality through other extended phenotypes that

provide useful information on others, such as offices and personal websites. It is probable that individuals can do this to be able to interact and react in social situations appropriately so that, for example, people are able to quickly assess someone's level of agreeableness to enable them to be on their guard should this person actually be fairly aggressive.

Furthermore, if it is a stereotyped image that is increasing mating success then this could explain the findings of those of higher artistic status having significantly more short-term relationships, since once the person discovers that their image of the artist does not necessarily fit the reality then they may end the relationship. However, it may also be that artists propagate this image, for a number of reasons, and one advantage to this is that they gain a greater number of short-term matings. Nevertheless, in general this appears to be the case for male artists but not female artists. Thus, since males tend to gain greater benefits and fewer costs from short-term relationships than females whatever is attracting potential mates to the artists the patterns of sexual behaviour do reflect those predicted by sexual selection.

Nevertheless, without knowing the complete picture as to how art evolved it must always be considered that art production may be an evolutionary by-product of another evolved mechanism rather than an adaptation. This is of course interesting in itself and still poses the question as to why individuals engage in art despite, at times, the obvious lack of rewards, and the fact it appears to be an almost universal behaviour.

Thus, while the findings within this thesis do provide the most direct and compelling body of evidence so far to support the proposal that art arose due to the pressures of sexual selection it would be premature to conclude that this is in fact the case. Further research is required before any conclusions can be made. Possible future projects will be discussed below.

## **11.2. THE RELEVANCE TO THE PSYCHOLOGY OF CREATIVITY**

Although there has been significant study of creativity within psychology, the evolutionary perspective has only recently begun to be explored. Nevertheless, evolutionary thinking can lead to a greater understanding of the core features of creativity and thereby help to provide a framework within which to place the knowledge already gained. Whilst the proximate causes of behaviour are frequently considered in psychology, an evolutionary approach offers possible ultimate causal explanations. To gain a complete understanding of a psychological phenomenon it is necessary to consider both.

This thesis offers some pieces to the puzzle as to whether visual art evolved through sexual selection. It therefore cannot provide a definitive answer to the evolution of art. However, if art did evolve through sexual selection then it can inform our understanding of, for example, sex differences in the public display of art. Whilst explanations regarding social inequalities certainly offer valid reasons for these differences, a consideration of the evolutionary reasons provides a possible understanding of the underlying motivations for such social behaviours and once these two approaches are united the behaviour and attitudes

become easier to comprehend and then, if desired, may lead to more effective challenging of such inequalities.

This research also offers some insights into the field of personality research. When personality traits are viewed through an evolutionary lens it can shed light on their ultimate functions. For example, an evolutionary explanation helps to provide an understanding as to why certain individuals are found more attractive, since personality traits that lead to increased survival or reproductive success are likely to be preferred in a partner. It also highlights the importance of the person perspective in creativity research and may help to explain some of the findings on personality of artists. For example, artists are often found to be higher in less agreeable characteristics. Whilst initially this may appear difficult to explain, when placed in an evolutionary framework such traits can be understood to lead to increased reproductive success, at least for men, and if art is sexually selected for this can provide an explanation for such results.

Evolutionary explanations for the emergence of art can also inform our perception of artists and the art world. They may explain some of the underlying motivations for why artists have the drive to produce and display their art, even when they may receive very little financial reward. It may also help to explain the content of artworks and the use of particular styles and colours if these are indicators of the artist's qualities. Of course, it is unlikely that artists are consciously using their artwork as a fitness indicator and such an explanation does not invalidate other reasons for producing art or the experiences the artist may gain by doing so. However, the ultimate drive to produce may be explained

by evolutionary reasons and the emotional experiences and reasons for producing art may motivate the artist to continue creating.

The contribution that an evolutionary account can provide to understanding art and creativity is therefore of considerable importance, particularly when taken in conjunction with proximate explanations. This highlights the importance of continued research to provide a comprehensive evolutionary explanation for the emergence of visual art. The next section will therefore explore possible avenues for future research that have emerged from this thesis and will take an evolutionary approach to art, and creativity, forward.

### **11.3. FUTURE RESEARCH**

This thesis provides some evidence for art evolving due to the pressures of sexual selection. However, there is considerably more work to be done before this theory can be supported or refuted. However, before considering new studies it would be valuable to expand the fitness indicator study. Probably the greatest weakness of this study was its low statistical power due to the small numbers of artworks that were rated. This was done to prevent rater fatigue. However, it would be possible to reduce the length of the questionnaire by removing some of the demographic questions and possibly the ratings for physical attractiveness and physical skill to concentrate on the personality, creativity and intelligence variables. If this was done then more artworks could be rated thereby increasing statistical power. Furthermore, artworks could be made by professional, amateur and non-artists to gain a much greater range of expertise in art. In fact, it would also be more realistic to get participants to rate



more than one artwork, perhaps two or three, by each artist since if artworks are acting as fitness indicators then potential mates are likely to view several artworks by an artist to gain a clearer picture of the artist's qualities. Moreover, if the artists also completed information on their actual mating success then this would also provide an indication of whether an artist's desirability is reflected in their artwork by considering their actual numbers of sexual partners and their frequency of being chosen as a dating partner in the study.

It would also be relevant to consider the personalities of the raters. There is evidence that certain personalities are attracted to particular styles of art (Furnham & Avison, 1997, Furnham & Walker, 2001a, Knapp & Wulff, 1963, Rawlings, 2003, Rosenbluh et al., 1972). Furthermore, from the third study in this thesis there was a suggestion that women may be using the style of the artwork to indicate the level of openness of the artist and then assortatively mate, at least for openness, on this variable. Thus a replication of the fitness indicator study that included an assessment of the raters' personalities would be able to consider the influence their personalities had on their choice of artist as a dating partner and on their ratings of the artworks and the artists.

Another aspect of the fitness indicator study which suggested the need for more research was the fact that it was unclear as to what aspects of the artworks were indicating the qualities of the artwork. To gain an understanding of what these aspects may be a team of coders (independent of the raters) could record the features of the artworks (strength of colour, complexity of content, etc) and these scores could be correlated with the rated and actual personality, intelligence and

creativity scores of the artists. From these scores an understanding could be gained of what cues are being used by the raters to score the characteristics of the artists and the accuracy of these cues. This method has been previously used on personality assessments of bedrooms and offices (Gosling et al., 2002) and so the results could be compared to this research.

Even if the results from the above studies support the sexual selection hypothesis they do not demonstrate that artworks are actually used as fitness indicators. To identify whether this is the case it would be necessary to gain information from the partners of artists. They could be asked whether they knew the artist's work before they met the artist, what they thought of the artist's work prior to and after meeting the artist, and what first attracted them to the artist. Information on their reproductive success and marital satisfaction would need to be gathered as well as completion of a personality measure for themselves and their partner (the artist).

One possibility that arose from this thesis is that more professional artists may not be having greater mating success due to their artworks acting as fitness indicators but rather that they are found more attractive due to the stereotypical image of the artist. In fact, the first study found that a highly creative individual's personality was viewed in a more positive light than is generally considered by the psychological literature to be the case. To consider this possibility a vignette-type study could be conducted. Photographs of individuals that are accompanied by a job title (including professional artist) would be rated on physical attractiveness and personality and the raters would choose which

individual they would most like to have a short and a long-term relationship with. The job titles would be rotated between photos for each of the raters and would have previously been rated for status and creativity. The raters would also complete a personality measure. The analysis would examine whether there was an effect of the perceived creativity of the job on desirability as a long and short-term partner and whether there was a relationship between personality, perceived creativity of the job and desirability.

There are of course other predictions made by the sexual selection hypothesis of creativity (Miller, 2001) including that there should be significant costs to producing artwork to ensure that only high quality individuals can produce high quality art, and that the findings here and in other studies looking at art and sexual selection (Haselton & Miller, in press, Nettle & Clegg, in press-b) are replicable across cultures and across different creative areas.

Finally, within this thesis a creativity continuum measure of self-rated creative ability was developed. Whilst there was some evidence for its validity further tests need to be conducted. In particular, correlating the creativity continuum with other tests of creativity, for example the Lifetime Creativity Scales (Richards et al., 1988) which also recognises that creativity is on a continuum rather than split between everyday and eminent creativity, would establish concurrent validity. Moreover, using it within an extended fitness indicator study would consider predictive validity. Although the creativity continuum did not appear to predict rated creative ability of the “artists” or the artwork the low numbers of artworks reduced the statistical strength of the results and so

conclusions as to the creativity continuum's validity can not be definitely made. If validity is demonstrated then as a quick and easy to use tool the creativity continuum will be a useful measure of self-rated creative ability that recognises that creativity is not an either-or construct.

Thus this thesis has begun to examine the most commonly proposed evolutionary reason for the emergence of creative behaviour, sexual selection, and provided some evidence to support this theory. Nevertheless, considerably more work is required to be able to determine why creative behaviour evolved. Such insights will be of relevance not only to the psychology of creativity but also of interest to The Arts, science, biology and archaeology.

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